

NOMINATION OF THE SETTLEMENT AND ARTIFICIAL MUMMIFICATION

OF THE CHINCHORRO CULTURE IN
THE ARICA AND PARINACOTA REGION



BORRADOR EXPEDIENTE
CHINCHORRO VERSIÓN 1

10 OCTUBRE 2018

CAPÍTULOS 1 A 4

NOMINATION OF THE SETTLEMENT
AND ARTIFICIAL MUMMIFICATION OF
THE CHINCHORRO CULTURE IN THE
ARICA AND PARINACOTA REGION

WORLD HERITAGE NOMINATION

REPUBLIC OF CHILE



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EXECUTIVE SUMMARY

- **State Party**
CHILE
- **State, Province or Region**
Arica and Parinacota Region, the Municipality of Arica and the Municipality of Camarones
- **Name of Property**
Settlement and Artificial Mummification of the Chinchorro Culture in the Arica and Parinacota Region
- **Geographical coordinates to the nearest second**

ID N°	NAME OF THE COMPONENT PART	REGION(S) / DISTRICT(S)	COORDINATES OF THE CENTRAL POINT	AREA OF NOMINATED COMPONENT OF THE PROPERTY (HA)	AREA OF THE BUFFER ZONE (HA)
01	Faldeo norte del Morro de Arica	Arica and Parinacota Region, Municipality of Arica	UTM Zone 19 Easting: 360470,2868 Northing :7955979,13	4,74 ha	222,47 ha
02	Desembocadura de Camarones	Arica and Parinacota Region, Municipality of Camarones	UTM Zone 19 Easting :367329,0496 Northing :7877733,2223	349,12 ha	701,36 ha
TOTAL AREA (IN HECTARES)				353,86 ha	923,83 ha

- **Textual description of the boundary(ies) of the nominated property**

Considering all the archeological evidence in the region and the different visions of the researchers regarding the hunter-gatherer-fishermen called the Chinchorro and the Property, they are found contextualized within a broad range of time that went from 7420 AP until approximately 2840 AP. However, it is worth mentioning that it was in the Valley of the Camarones (Camarones Site 14), around about 7000 AP when artificial mummification arose, which was a unique and exceptional feature of the Chinchorro.

So, the presence, development and disappearance of these cultural groups, including their polychromatic mortuary practices varies for a few centuries depending on the region studied and the focus of the study. Therefore, the Chinchorro groups, during the archaic period and responding to a process of adaptation of the group of hunter-gatherers to their arid surroundings, occupied the gullies, coasts and wetlands – all associated with the mouths of the rivers – to the far north of the Atacama Desert in Chile.

The Chinchorro groups were able to achieve a successful human adaptation to extremely arid surroundings, capitalizing on specific environmental conditions in the area, making use of the abundance of resources along the coast as a result of the marine diversity generated by the influence of the Humboldt current as well as the availability of water around the limited local sources of this resource, such as streams and tiny rivers that flowed down to the sea permanently. These environmental conditions enabled the Chinchorro groups to establish permanent camps along the coast and in a gradual process of early sedentarism based on their exploitation of the coastal resources.

This pattern of settlement is not characteristic of hunter-gatherer groups, but rather typically of societies producers of food. But the Chinchorro – based on a fishing, hunting and gathering economy which is normally associated with a pattern of residence with permanent mobility - broke this traditional scheme and developed around 7000 AP, a complex system of coastal subsistence whilst permanently exploiting resources from the sea and the salty wetlands.

The theory that Chinchorro groups settled permanently in certain enclaves leads to the problem of the archeological paradigm prevalent for marine hunter-gatherers all over the world: it begs the question as to the social aggregation of bands as a social structure and it adds a query as to high mobility as a fundamental

part of the marine hunter-gatherers and it also questions agriculture as a determining element of early sedentarism.

Records of this human group include a series of archeological sites in which are preserved, to a large extent, environmental, technological, mortuary and spiritual attributes that make up the identity and uniqueness of the Chinchorro Culture. The lifestyle of the Chinchorro extended over a territory that covered the Far North of Chile and the South of Peru where most of the archeological sites linked to the Chinchorro culture tradition are found along a coastal floor, or at least only a few kilometers from the coast. However, the best evidence is found in the north of Chile, specifically within a territory that runs from Arica to Punta Patillo and which includes in that extension the river valleys of Lluta, Azapa, Vitor, Camarones and Camiña (Sheet 18).

The Chinchorro used a specialized technology when exploiting the marine resources that enabled them to use different kinds of tools prepared using mostly local resources such as vegetable fibers and wood obtained from the cattails and reeds in the local wetlands, shells and bones from mammals, shellfish, fish and marine birds they hunted as well as the leather obtained from those same animals. But they also incorporated other resources such as lithic, skins and fibers from cameloids obtained from further inland¹⁻².

Likewise, they dominated the surrounding area in the sense that they possessed an exhaustive knowledge about the resources available, the land and routes over it, and this enabled them to deploy their adaptive skills. Those resources they were unable to find along the coast were brought into their economy by fanning out over the highest lands of the interior valleys where they made use of seasonal camps. During their occupation by the Chinchorro of the Atacama Desert, the technological changes observed over time point to an intensification in the use of the resources about their subsistence¹⁻³.

On a more spiritual and ideological level, the Chinchorro developed a deep-seated connection with their dead and this gave rise to historically unprecedented manifestations worldwide with the application of techniques they used when preparing bodies post-mortem which arose around 7000 AP. They developed artificial mummification procedures that gave rise to a varied range of styles^{2,4-7}. These forms of expression associated with their funerary practices had to be based, ideologically, on a complex system of beliefs and specialization that enabled them to maintain it over thousands of years.

Artificial mummification by the Chinchorro is a surprising element because of its complexity and artistic beauty^{3,8}. In practice, mummification was carried out using the same tools, materials and resources they had at hand for their daily subsistence when tackling a human problem so universal as the death of the members of the community. The funeral and domestic spaces were close together on the inside of the camps of these marine hunter-gatherers and the deployment of their adaptive strategy whilst interacting between the living and dead over a prolonged period would give rise to a landscape that was characteristically Chinchorro in these territories.

The artificial mummification of the Chinchorro reveals styles defined with colors, shapes and characteristic materials which required complex anatomic interventions, together with the presence of specialists from among the populace⁹. This enabled them to construct modeled bodies for the deceased members of the group that ritually continued forming part of their daily lives. Spiritually, they thought up complex mortuary manifestations – the oldest in the world – including historically unprecedented artificial mummification procedures. These funereal practices are of an artistic and spiritual nature because they express all the Chinchorro beliefs; their perception of life and death.

Of the whole of the vast territory where Chinchorro groups were present, two components were selected from the Settlement zone that complied with the following criteria:

1. That the territory be found inside an absolute and/or relative period of dates and the spatiality of the Chinchorro settlement.
2. That the territory contains the attributes defined for the Property: bodies artificially mummified and/or a Chinchorro context based on scientific research.
3. That the site be in a state of conservation of its attributes that enables its outstanding universal value to be comprehended.
4. That there exist in the territory a body or a group of persons who could be relied upon to protect, manage and handle the component.

Prominent among this territorial occupation, because of the conditions of authenticity and integrity as well as the conservation of the attributes, are the components on the Faldeo Norte del Morro de Arica and at the Desembocadura de Camarones as being the most representative of the Chinchorro settlement. Therefore, the Property to be nominated is a serialized site made up of the two components mentioned.

The Faldeo Norte del Morro de Arica and the Desembocadura de Camarones as components of the serialized Property called the Settlement and Artificial Mummification of the Chinchorro Culture consists of areas of dense deposits of middens, residential and burial sites that are closely related to each other; conserving below the ground a unique testimony that conveys the technological and spiritual complexity reached by this society of marine hunter-gatherers, covering a variety of their cultural expressions; from their coastal beginnings (ca. 7400 AP) until their disappearance (ca. 2840 AP).

The components belonging to the Property; i.e. the Faldeo Norte del Morro de Arica and the Desembocadura de Camarones stand as the nucleus of the Chinchorro cultural tradition because they contain deposits and natural areas of high significance as a representative testimony to the habitat and the spaces of daily relations of the Chinchorro groups, of their areas of recollection (shell fish, fibers and vegetables), fishing and hunting (on both sea and land) as well as where they stayed overnight, prepared their food and cultivated their bonds with their dead.

Within an environmental context privileged by the mouths of rivers and maintaining a social organization of marine hunter-gatherers, their cosmovision gave rise to a scenario that was uniquely Chinchorro and which involved the living as well as the dead in their recurring use of the same spaces over generations. The human and material remains associated with the components of the Property provide evidence of such practices as the domestic and ritual subsistence deployed by the Chinchorro over approximately four millennia in these territories.

- **The Property's attributes**

The environmental context of the mouth and ravines of the rivers

Archeological deposits and stratigraphy in situ which reveal the dynamics of occupation of the space over time.

Archeological sites: Cemeteries and domestic sites.

In the case of Component 01, Morro 1 is found on the Coastal Cordillera that flanks the south-west side of the city of Arica as the largest Chinchorro cemetery excavated and which has provided a large amount of archeological evidence as well as the largest amount of mummified bodies. This cemetery has been the source of numerous studies, prominent among which are those that have enabled the current types of mummification to be defined. The Properties and the Chinchorro mortuary pattern can also be found in other neighboring areas of the Faldeos on this hill, such as Morro 1/5 and Morro 1/6. The case of the site of the Colón 10 Museum, adjacent to the Morro 1 site is the only interpretive space where an extensive cemetery can be found in situ with evidence of extensive bodies resting dorsal decubitus. In the case of component 02, the Desembocadura de Camarones, the site of Camarones 14 contains evidence of an extensive temporary occupation of the sector and where the funeral and domestic area overlap each other, besides providing the earliest dates of Chinchorro artificial mummification; i.e. 7000 AP²⁻³. A little further south and along the coast, although still in the same area, is Camarones 15 which also contains evidence of these marine hunter-gatherers from the Archaic and where progressive social adaptation can also be observed, into which new cultural features from within the region have been incorporated.

Human bodies, treated and untreated

The Chinchorro cemeteries reveal bodies naturally mummified; i.e., because of the environment and artificial or human mummification. The latter is unique and of an outstanding universal value because of its complexity, age and aesthetics⁸. The Chinchorro innovated continuously in their primitive practices of artificial mummification, revealing an astonishing technical ability and early perfectionism of complex mortuary practices that meant systematically dismembering bodies and reassembling them to create artificial mummies that possessed extraordinary material, sculptural and aesthetic qualities that reflected the fundamental social role of the dead in human society.

Artifacts

They had a series of tools and implements which were simple but effective and which enabled them to make intensive use of local resources.

- **map(s) of the nominated property, showing boundaries and buffer zone**

SHEET	DESCRIPTION	SCALE	SIZE-FORMAT
1	Map location of Chile in South America	1:28.000.000	A3
2	Map of Chile, regional division	1:15.000.000	A3
3	Map of the Arica and Parinacota Region and its communes	1:2.000.000	A3
4	Map of the Property: Settlement and Artificial Mummification of the Chinchorro Culture	1:300.000	A3
5	Map Component 01, Faldeo Norte del Morro de Arica in the context of the city	1:100.000	A3
6	Map Component 02, Desembocadura de Camarones and its context	1:100.000	A3
7	Map Component 01, Faldeo Norte del Morro de Arica in the context of the city	1:50.000	A3
8	Map Component 02, Desembocadura de Camarones and its context	1:50.000	A3
9	Map Component 01, Faldeo Norte del Morro de Arica, Archeological Sites.	1:2.500	A3
10	Map Component 02, Desembocadura de Camarones, Archeological Sites	1:18.000	A3
11	Map Component 01, Faldeo Norte del Morro de Arica, with satellite image in the back-ground	1:5.000	65x65
12	Map Component 02, Desembocadura de Camarones, with satellite image in the back-ground	1:5.000	92x105,5
13	Map of Component 01, Faldeo Norte del Morro de Arica- Cadastral survey plan	1:5.000	65x65
14	Map of location, Component 01, in situ Museum Colon 10 and buffer zone	1:2.500	A3
15	Map of location, Component 01, in situ Museum Colon 10 and urban context	1:500	A3
16	Architectural plans, Component 01, in situ Museum Colon 10, first and second floor	1:100	85x85
17	Planimetry- Cuts and facades, Component 01, in situ Museum Colon 10.	1:100	100x85
18	Map of Archeological Sites of the Chinchorro Culture in the North of Chile.	1:950.000	A3
19	Map of hydrographic network in the Arica and Parinacota Region.	1:2.000.000	A3
20	Climate classification map of Köppen-Geiger in the Arica and Parinacota region	1:2.000.000	A3
21	Archaeological map showing the location of Component 02 and Conanoxa Site	1:150.000	A3
22	Archeological map of the Northern Hillside of Morro de Arica and Ravine of Acha	1:50.000	A3
23	Map of temporality and tipology of archeological sites	1:300.000	A3
24	Geomorphological map of Component 01, Faldeo Norte del Morro de Arica	1:25.000	A3
25	Geological map of Component 02, Desembocadura de Camarones	1:25.000	A3
26	Geological hazard map, Component 02 Desembocadura de Camarones	1:25.000	A3
27	Map of Territorial Planning Instruments, Component 01, Faldeo Norte del Morro de Arica	1:15.000	A3
28	State of conservation and control points, Component 01, Faldeo Norte del Morro de Arica	1:5.000	A3
29	State of conservation and control points, Component 01, Faldeo Norte del Morro de Arica with potential flood zone due to tidal waves in the city of Arica	1:5.000	A3
30	State of conservation and control points, Component 02, Desembocadura de Camarones	1:11.000	A3
31	State of conservation and control points, Component 02, Desembocadura de Camarones, Subcomponents north and south terrace	1:5.000	A3
32	Zoning of uses, Component 02, Desembocadura de Camarones. Source: Management Plan	1:20.000	A3
33	Zoning of uses, Component 01, Faldeo Norte del Morro de Arica. Source: Management Plan	1:5.000	A3

- **Criteria under which property is nominated**

The Settlement and artificial mummification of the Chinchorro Culture complies with criterion (iii): To provide a unique, or at least exceptional testimony of the cultural tradition or a civilization, alive or dead, as a result of which, some 8000 years ago, the first groups of hunter-gatherers living along the northern coast of the Atacama Desert and which we now know as the Chinchorro Culture, adapted a pattern of settlement in privileged habitats – mouths of rivers and ravines along the coast – within a context of extreme aridness. Out of a dominance of their surroundings and the sustainability of permanently establishing themselves in the territory, a sense of belonging and rootedness arose as well as a complex ideology and spirituality that led them to live alongside their deceased, thus giving origin to the Chinchorro Settlement.

This cosmovision led them to develop a practice of artificial mummification, considered the oldest in the history of Humanity, of a noticeable complexity for such groups of fishermen, marine hunters and gatherers. The important remains left behind by the Chinchorro stand as a testimony to their system of beliefs and ideas regarding the afterlife along the coast of the far north of Chile; one of the most arid in the world.

- **Draft Statement of Outstanding Universal Value**

Declaration of integrity

The archeological settlement found on the components of the Faldeo Norte del Morro de Arica (in the city of Arica) and at the Desembocadura de Camarones (Camarones Valley), some 100 kms from each other, constitute a representative and exceptional series as nuclei of the Chinchorro Culture. The uniqueness of these components, which complement each other, lies inasmuch that, along the North Coast of Chile can be found, individually, the largest amount and diversity of archeological sites and attributes representing the Chinchorro culture and which have lain untouched for over 7000 years up to today.

Both individually as well as a whole, the degree of integrity of these two components guarantees their permanence in situ of all the attributes necessary for providing the relevant and fundamental information when it comes to understanding the Property and the delimitations of the nucleus and buffer zone that will enable the adverse effects of development to be kept under control. The integrity of the environmental and archeological contexts stands as a testimony to the outstanding relationship between the lifestyle of a marine hunter-gatherer society and their vision of the afterlife during one of the most arid regions of the planet.

Located along slopes and on terraced levels, the archeological settlement of the Chinchorro of the Morro de Arica and the Desembocadura de Camarones conserve extensive areas of archeological deposits and they preserve the attributes that make up a documentary body and evidence of the lifestyle of these human groups and their exceptional funereal art which grants them their outstanding universal value.

Declaration of Authenticity

The authenticity of the settlement of the Chinchorro Culture is vouched for because of the presentation of the attributes presently defined, such as: the environmental context, the presence of archeological sites, stratigraphic deposits as well as the artifacts and human remain deposited in an area around the Faldeo Norte del Morro de Arica and at the Desembocadura de Camarones. When dealing with a settlement, the expression of its attributes and values depends to a large degree on the process of interpretation of the remains found and a study of their habitat. In that sense then, immersed in the desert climate present in the region, the components of the Property have been preserved in good condition, especially those attributes that are below the surface because they remained preserved in their original state; albeit with the differences already mentioned about the state of the environmental contexts regarding each one of the components.

The components of the Property, Faldeo Norte del Morro as well as the Desembocadura de Camarones exhibit a varied and extensive range of sources of information of a scientific, historic, archeological, bio-anthropological, geological, environmental and regulatory nature that enables a clear and complete picture to be established regarding the attributes and values of the Property. This is backed up by an important pile of archeological and bio-anthropological evidence studied over a century of research which has enabled a knowledge of the nature, specificity, significance and history of this cultural heritage to be learned.

The research carried out around the archeological sites of the Components – be they domestic or mortuary – and the human and material remains that make up both components, have generated a significant amount of information on their associations, functions and contexts. This research includes specialized analyses as well as radiocarbon dating processes that have enabled us to understand the sequence over time of the Chinchorro cultural tradition on a broad scale; covering the development and variability of their cultural expression; from their beginnings (ca. 7400 AP), and until their disappearance (ca. 2840 AP)^{4,8,10}.

The Settlement of the Chinchorro Culture has been researched scientifically for almost a century, starting with the first excavations by Uhle in 1919. Although during the first few decades research was more sporadic, knowledge of the Chinchorro cultural tradition has developed systematically since the consolidation of local institutions. First, since the end of the nineteen fifties when the Regional Museum was created, and which paved the way for the present Regional Museum of San Miguel de Azapa; then, with the work carried out under the auspices of the University of Tarapacá, including the progressive incorporation of research, many of them still active specialists. What is known about the Chinchorro, such as studies of their archeological sites, has been endorsed in a series of national and international scientific conferences and publications¹⁻¹¹. This scientific production – consisting of more than a hundred publications – guarantees the authenticity of the contexts studied and this document is based on the data, contents and interpretations of the archeological and bio-anthropological evidence found therein.

The job of conservation in the museums has led to remains being preserved that had been dug for study, with a view to enabling them to be interpreted in the future by the public in general and by researchers. The Museum at Colón 10 Site has given priority to the conservation of these attributes in view of the risks of transferring the bodies to the museum. Although a large part of the mummified bodies have been salvaged from their burial sites, the institutions responsible for them have complied with the job of conserving the structural, ornamental and chromatic attributes of the bodies artificially mummified; especially expressed in those bodies with a complex mummification.

About the artifacts that belonged to the Chinchorro, they were made with products obtained from their surroundings, such as the flora (matting, reeds, and cacti), fauna (birds, mollusks, fish, seals and cameloids) as well as minerals present in the region and which can still be found. These are fragile elements exposed to deterioration once dug up from the ground and which are best conserved in the conditions in which they were buried. The job of conservation in situ and in museums has maintained the attributes in such a state that they that retell the creative use by these early settlers of the limited resources in the surrounding desert.

All told, the use and functions of the attributes making up the Settlement enable the lifestyle of the Chinchorro as marine hunter-gatherers, to be interpreted, revealing a pattern of stable residence and visible permanence by observing their funereal and domestic contexts that are conserved in their original places of deposit. The archeological sites researched in each Component have enabled their use and functions to be made known, thus exhibiting a recreation of their funereal and domestic contexts in local museums for a better comprehension of their significances and values.

The present location of the Components of the Property is the same as that occupied over several millennia by the Chinchorro. Here as where they established their camps and cemeteries; the remains that were deposited in them still visible. The surroundings have modified about the component, Faldeos del Morro, now a part of the urban landscape of Arica, although the panoramic view still exists from the sites over the coastal esplanade. At the Desembocadura de Camarones the main environmental conditions remain intact and which characterize the surroundings of the Chinchorro during their original occupation. Because we are dealing with a rural area barely populated; it is here that we can fully admire the elements that contributed toward the environmental context in which the settlement developed.

The components of the Property amount to an archeological site and stratigraphic deposits that stand as a unique testimony to the development of the Chinchorro cultural tradition and they are representative of their exceptional and outstanding traditional practices, such as artificial mummification. These deposits testify to the spaces occupied by the Chinchorro groups (along the Coast of the Atacama Desert) and they provide an account of their use in a diversity of material and human remains. They constitute a material and cultural repository of scientific value as they contain bio-anthropological evidence and artifacts that conserve their properties unaltered since their origins, thus allowing the Chinchorro occupations to be placed within a certain timeframe (ca. 7400-2840 AP) and within a social and economic context.

- **Proposed Statement of Outstanding Universal Value**

The north coast of the Atacama Desert, in an arid and hostile habitat, was home to the Chinchorro, a society of marine hunter-gatherers during the period between approximately 7400 to 2840 AP. They developed an early and successful adaptation of an extreme geography represented by the juxtaposition of a hyper-arid coastal desert rich in extraordinary marine resources, scant river courses and the rugged relief of the Coastal Cordillera.

This unique adaptation gave rise to the Settlement and artificial mummification of the Chinchorro Culture which is found on the Faldeo Norte del Morro de Arica and at the Desembocadura de Camarones; two sectors

that are unique and outstanding witnesses to the Chinchorro Culture and which preserve an environmental context in archeological sites with a profound stratigraphy as well as an extraordinary conservation of organic and cultural remains – offering a unique record of the development of the hunter-gatherer societies in the center-south Andean region.

The funereal traditions of the Chinchorro are present in the Property and this is particularly found in the practice of artificially mummifying bodies using highly developed and specialized skills. This treatment is in addition to the unprecedented practice of rebuilding and remodeling the bodies of complete individuals of all ages, but especially children and unborn fetuses^{1,3}. Because of the archeological sites, stratigraphic deposits and human remains salvaged over a century of archeological research, we now know that the bodies artificially mummified reveal a wide variety of technical and material practices as well as plastic solutions.

The Property is a unique witness to the whole of the sequence of the cultural development of the Chinchorro groups and their exceptional tradition of funerary art which has enabled us, over several decades, to research, get to know and interpret the lifestyle of a coastal hunter-gather society and their vision of the afterlife, characterized by the oldest artificial mummification practice of bodies and which, with several cultural variances, lasted for 4000 years.

The immeasurable remains of this material and the mummification techniques of the Chinchorro are of utmost scientific importance to the world because they challenge the academic community to reconsider their current understanding of systems of beliefs, ritual practices and the social organizations of the very first hunter-gatherer societies.

- **Name and contact information of official local institution/agency**

Organization: Corporación / Universidad de Tarapacá

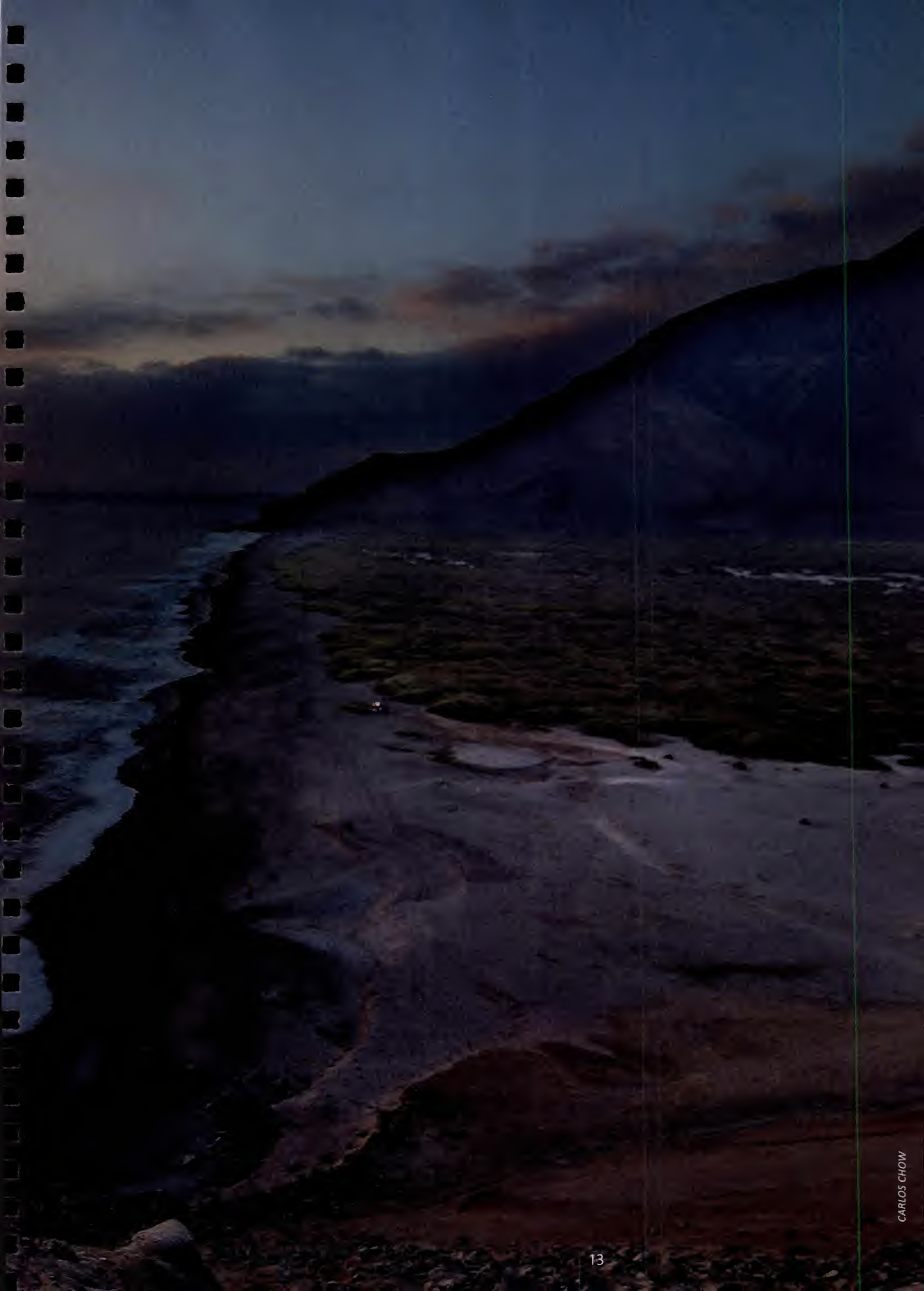
Address:

Tel:

Fax:

E-mail:

Web address:





1





IDENTIFICATION OF THE PROPERTY



1. IDENTIFICATION OF THE PROPERTY

1.a Country (and State Party if different)

Chile

1.b State, Province or Region

Arica and Parinacota Region, the Municipality of Arica and the Municipality of Camarones

1.c Name of Property

Settlement and Artificial Mummification of the Chinchorro Culture in the Arica and Parinacota Region

1.d Geographical coordinates to the nearest second

ID N°	NAME OF THE COMPONENT PART	REGION(S) / DISTRICT(S)	COORDINATES OF THE CENTRAL POINT	AREA OF NOMINATED COMPONENT OF THE PROPERTY (HA)	AREA OF THE BUFFER ZONE (HA)	SHEET N°
01	Faldeo norte del Morro de Arica	Arica and Parinacota Region, Municipality of Arica	UTM Zone 19 Easting :360470,2868 Northing :7955979,13	4,74 ha	222,47 ha	Sheet 4-5-7-9-11-13
02	Desembocadura de Camarones	Arica and Parinacota Region, Municipality of Camarones	UTM Zone 19 Easting :367329,0496 Northing :7877733,2223	349,12 ha	701,36 ha	Sheet 4-6-8-10-12
Total area (in hectares)				353,86 ha	923,83 ha	

1.e Maps and plans, showing the boundaries of the nominated Property and buffer zone

List of maps that identify the Property

SHEET	DESCRIPTION	SCALE	SIZE-FORMAT
1	Map location of Chile in South America	1:28.000.000	A3
2	Map of Chile, regional division	1:15.000.000	A3
3	Map of the Arica and Parinacota Region and its communes	1:2.000.000	A3
4	Map of the Property: Settlement and Artificial Mummification of the Chinchorro Culture	1: 300.000	A3
5	Map Component 01, Faldeo Norte del Morro de Arica in the context of the city	1:100.000	A3
6	Map Component 02, Desembocadura de Camarones and its context	1:100.000	A3
7	Map Component 01, Faldeo Norte del Morro de Arica in the context of the city	1:50.000	A3
8	Map Component 02, Desembocadura de Camarones and its context	1:50.000	A3
9	Map Component 01, Faldeo Norte del Morro de Arica, Archeological Sites.	1:2.500	A3
10	Map Component 02, Desembocadura de Camarones, Archeological Sites	1:18.000	A3
11	Map Component 01, Faldeo Norte del Morro de Arica, with satellite image in the background	1:5.000	65x65
12	Map Component 02, Desembocadura de Camarones, with satellite image in the background	1:5.000	92x105,5
13	Map of Component 01, Faldeo Norte del Morro de Arica- Cadastral survey plan	1:5.000	65x65
14	Map of location, Component 01, in situ Museum Colon 10 and buffer zone	1:2.500	A3
15	Map of location, Component 01, in situ Museum Colon 10 and urban context	1:500	A3
16	Architectural plans, Component 01, in situ Museum Colon 10, first and second floor	1:100	85x85
17	Planimetry- Cuts and facades, Component 01, in situ Museum Colon 10.	1:100	100x85
18	Map of Archeological Sites of the Chinchorro Culture in the North of Chile.	1:950.000	A3
19	Map of hydrographic network in the Arica and Parinacota Region.	1:2.000.000	A3
20	Climate classification map of Köppen-Geiger in the Arica and Parinacota region	1:2.000.000	A3
21	Archaeological map showing the location of Component 02 and Conanoxa Site	1:150.000	A3

22	Archeological map of the Northern Hillside of Morro de Arica and Ravine of Acha	1:50.000	A3
23	Map of temporality and tipology of archeological sites	1:300.000	A3
24	Geomorphological map of Component 01, Faldeo Norte del Morro de Arica	1:25.000	A3
25	Geological map of Component 02, Desembocadura de Camarones	1:25.000	A3
26	Geological hazard map, Component 02 Desembocadura de Camarones	1:25.000	A3
27	Map of Territorial Planning Instruments, Component 01, Faldeo Norte del Morro de Arica	1:15.000	A3
28	State of conservation and control points, Component 01, Faldeo Norte del Morro de Arica	1:5.000	A3
29	State of conservation and control points, Component 01, Faldeo Norte del Morro de Arica with potential flood zone due to tidal waves in the city of Arica	1:5.000	A3
30	State of conservation and control points, Component 02, Desembocadura de Camarones	1:11.000	A3
31	State of conservation and control points, Component 02, Desembocadura de Camarones, Subcomponents north and south terrace	1:5.000	A3
32	Zoning of uses, Component 02, Desembocadura de Camarones. Source: Management Plan	1:20.000	A3
33	Zoning of uses, Component 01, Faldeo Norte del Morro de Arica. Source: Management Plan	1:5.000	A3

1.f Area of nominated Property (ha.) and proposed buffer zone (ha.)

ID N°	NAME OF THE COMPONENT PART	AREA OF NOMINATED COMPONENT OF THE PROPERTY (HA)	AREA OF THE BUFFER ZONE (HA)
01	Faldeo norte del Morro de Arica	4,74 ha	222,47 ha
02	Desembocadura de Camarones	349,12 ha	701,36 ha
TOTAL		353,86 ha	923,83 ha



1 2 3 4 5 6 7 8 9 10 11



DESCRIPTION

2. DESCRIPTION

2.a. Description of the Property

2.a.i. Physical Environment

The following describes the main aspects of the physical environment of the Property and the components Faldeo Norte del Morro de Arica and Desembocadura de Camarones.

Climate

The climate of the Arica and Parinacota region is determined by its latitude (around 18° and 19° S, north of the Tropic of Capricorn), which causes southwestern winds to predominate all year. In addition, the region is under permanent influence of the South Pacific anticyclone, a high-pressure center that causes the descent of relatively dry, warm air from the Equatorial region and inhibits the formation of clouds at the mid and upper levels of the atmosphere. The former enables the permanent occurrence of good weather and the absence of rain in the coastal areas and the Intermediate Depression (between the Coastal and Andean cordilleras)¹.

Precipitation in the region is scarce, with a marked intensification from the littoral zone towards the Altiplanic region. In the coastal area where the Property is located, annual precipitation does not exceed one millimeter and concentrates in winter (Mediterranean tendency). On the contrary, in the Altiplanic region, precipitation occurs predominantly in the summer, caused by the arrival of air masses loaded with humidity from the Amazon Basin (tropical influence). The former allows accumulated annual precipitations to surpass 300 mm for the Altiplanic region, in a phenomenon known as *invierno boliviano* or *invierno altiplánico* (Altiplanic winter)¹, that determines the availability of water in the main rivers, as is the case for the Camarones and San José rivers, whose headwaters are located in the western part of the Altiplano.

Another relevant aspect in the region's climate is the presence of the Humboldt Current, that corresponds to a cold oceanic current that moves northward along the coast of the region, activated by the southwestern wind regime predominant on the oriental border of the South Pacific anticyclone. This current has a moderating effect on the air's temperature in the littoral zone; due to its cold nature, it causes smaller amounts of marine water to evaporate and high air masses that reach the continent from the Pacific Ocean to be relatively dry. The former and the presence of the South Pacific anticyclone explains the great aridity of the region. Furthermore, due to the presence of the Humboldt Current, warm superficial air masses, specially below 1,000 m, that pass over the current cool down, condensing and forming low stratus and superficial fog, frequent in coastal zones. This phenomenon is locally known as *camanchaca* and its advance into the continent is stopped by coastal cliffs, penetrating slightly inland through the valleys, just like it occurs in the Camarones Valley (Figure 1).

El Niño-Southern Oscillation (ENSO) also influences the region's climate, because during the years that this phenomenon occurs, the air's temperature can increase by 1° or 2° C above normal. Moreover, in years where La Niña (anti-ENSO phase) takes place, an increase in summer precipitations in the Altiplano occurs¹.

According to the Köppen classification for the Arica and Parinacota region, the coastal area where the Property is located has a desert climate with abundant cloud cover, with plenty of morning fog, especially in coastal cliff areas. Temperatures fluctuate between 13°C and 22°C, with a daily thermal oscillation of 5° to 7°C and an annual thermal amplitude of about 6°C¹.



- *Figure 1: Camanchaca or coastal fog in the Camarones Valley*
SOURCE: CALDENTY 1

Hydrology

The Arica and Parinacota region contains six main drainage basins: De la Concordia Ravine, Lluta River, San José River, Camarones River, Vitor-Codpa coastal basins and the Altiplanic basins². The area of Faldeo Norte del Morro de Arica is located in the San José River Basin, while the area of Desembocadura de Camarones belongs to the homonymous river basin.

- **San José River Basin**

The San José River Basin comprises an area of 3,187 km², its main tributaries in its headwaters are the Laco, Seco and Ticnamar rivers². It is one of the main rivers in the region, since it provides water for irrigation in the Azapa Valley.

When Altiplanic winter events (December to March) occur, the Ticnamar River supplies large and unexpected volumes of water to the San José River. When this occurs, the latter drains into the ocean in the city of Arica. The remainder of the year, the San José River lacks water flow from Humagata (located 1,600 m a.s.l. and around 60 kilometers from the city of Arica) to its river mouth. However, the water that is diverted from the Lauca River (through the Azapa Canal) provides 600 L/s to the San José River, which is discharged through the Chapiquiña hydroelectric station. Moreover, there are two groups of springs that in situations of prolonged deficit of precipitation do not contribute water to this basin².

The average volume of flow of the San José River is only 1 m³/s. Its water has a medium-high salinity (greater than 1 dS/m, where water with 0,75 dS/m is suitable for all types of crops) and concentrations of boron below 1 ppm (the Chilean norm allows 0,75 ppm as upper limit for irrigation); this means, it does not possess the optimal conditions for irrigation, although comparatively its conditions are better than Lluta River's, located further north³.

The summer flooding of the San José River, generated by high rainfall in the Andes, can have quite negative effects on the city of Arica. Records from the *Dirección General de Aguas* (DGA or Directorate General of Waters) indicate that flooding with a 10-years return period (volumes of flow greater or equal to 30 m³/s) have damaged the city's port, tourist and housing infrastructure. There are also records of greater floods, like the one in 2001, when a discharge of 160 m³/s was registered and to which a return period of 50 years is assigned³.

- **Camarones River Basin**

This river basin is located in the southern part of the Arica and Parinacota region and originates from the confluence of the Caritaya River from the south and the Ajatama River from the north, 2,900 m a.s.l. This catchment basin drains a total area of 2,317 km². The valley borders the Vitor River Basin to the north and the Tana or Camiña Ravine to the south. To the east, it is bound by the Salar de Surire and to the west by the Pacific Ocean⁴.

Given its origin in the Altiplanic region, the Camarones River Basin has a permanent regime, with higher volumes of flow in the summer months due to high-Andean storms³. The Camarones River, this drainage basin's main watercourse, receives intermittent contributions from the Saguara and Humallani ravines. It spans 97 km in a narrow alluvial valley, with a width varying between 25 and 700 m, where activities like agriculture and animal husbandry are carried out⁴. The average annual flow of the river is 0,4 m³/s, measured at the gauging station that is downstream from the area of agricultural use. In the mouth of the river, current drainage conditions generate a small lagoon adjacent to the beach area, where there is a wetland.

The quality of the water from the Camarones River is not good, it has high salinity (3.4 dS/m) and high boron content (30 ppm)³. It also has high contents of arsenic, mercury and manganese, in addition to high concentrations of chlorides⁵.

Geology

The study area encompasses the coastal sector comprised between 18° and 19° S. At this latitude, the main relief units correspond from west to east to the Coastal Cordillera, Intermediate Depression, Western Cordillera (Andean Cordillera) and the Altiplano. The sectors at Faldeo Norte del Morro de Arica and Desembocadura de Camarones, where the Property is located, include the western area of the Coastal Cordillera, and at a local level, a series a geological unit with different characteristics and ages can be distinguished.

Component 01- Faldeo Norte del Morro de Arica

The geological units that jut out in this area, span ages ranging from the Jurassic to the Holocene periods and are described below.

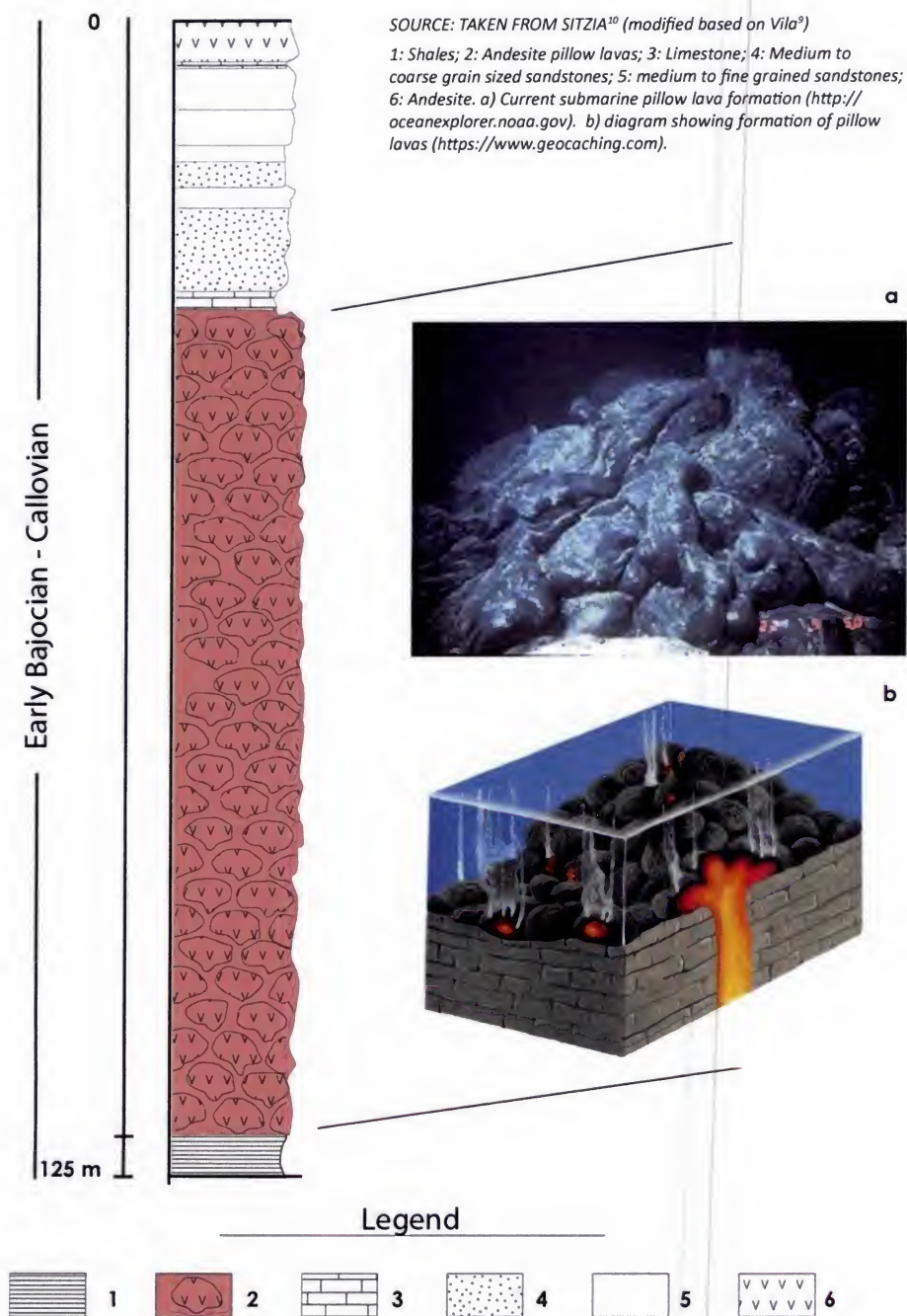
- **Camaraca Formation⁶**

It is essentially a volcanic succession that crops out in the Coastal Cordillera from Arica toward the south. It is made up of andesitic, in part basaltic, lavas of dark green, gray and reddish brown colors, and in smaller proportion, with intercalations of basaltic and dacandesitic lavas, tuffs and sedimentary rocks (sandstones, breccias, limestones, conglomerates and shales). The unit is folded and mainly homoclinal, east-dipping and it is cut by subvertical faults⁷.

At a local level, in the Morro de Arica sector, the unit is a 120 m thick succession, from base to top made up of dark green shales, andesitic pillow lavas (80 m thick), glauconitic sandstones, graywackes and gray limestones^{6,8,9} (Figure 2).

Rocks from the Camaraca Formation have, locally, a moderate to advanced degree of propylitic hydrothermal alteration and/or are affected by an incipient low-grade metamorphism⁷.

Based on the fossiliferous material found in sedimentary intercalations of the unit and considering the results of K-Ar dating in lavas, García et al.⁷ assigns it a Middle Jurassic age.



• Figure 2: Synthetic stratigraphic column observed at Morro de Arica

- **Oxaya Formation^{11, 7}**

This unit is made up of ignimbritic tuff layers, which are in part very welded, with intercalations of sandstones, conglomerates, limestones, and andesitic and dacitic lavas. Based on radiometric dating performed on tuffs from the unit, García et al.⁷ assigns it an Upper Oligocene - Lower Miocene age.

- **Alluvial Deposits from the Coastal Cordillera⁷**

Subhorizontal, detritic continental sedimentary deposits fill isolated depressions in the Coastal Cordillera. These deposits of restricted extent fill paleodepressions formed within the rocks of the Camaraca Formation. These deposits reach a thickness of up to 50 m and are composed of sand, fine and medium grained gravels and semiconsolidated brown, gray and red silts. There is lenticular stratifications of decimetric and centimetric thickness. In Pampa Aeródromo El Buitre (a desert plain) sandstones crop out that are in part conglomerate, matrix-supported gravels of fine grain size and reddish-brown, gray and red silts. Their sedimentological characteristics permits interpreting them as products of hyperconcentrated, low thickness flows, for the most part detrital and subordinately muddy; they are from a proximal to distal alluvial environment, varying sometimes to a distal fluvial environment. According to its stratigraphic and incision relationships it is assigned an Upper Miocene - Pliocene age.

- **Pliocene Fluvial Deposits⁷**

These fluvial deposits correspond to brown, gray, green and yellow, semiconsolidated, sands and clast-supported gravels with intercalations of silts, tuffs and epiclastic deposits, and locally, salt layers. These deposits form extensive mantles and 'hanging' terraces, and they are dissected by the Pleistocene fluvial and alluvial deposits. They are well stratified, in continuous and lenticular layers of varying thickness (from centimeters to meters). They have been interpreted as proximal to distal alluvial deposits, product of debris and mudflows.

- **Pleistocene Fluvial Deposits⁷**

Pleistocene fluvial deposits correspond to clast-supported, semiconsolidated gravels with intercalations of sands, silts and, locally, diatomites. They are distributed along major riverbeds, both active and intermittent, from the Lluta, Azapa, Vitor, Camarones and Lauca/Camiña river canyons; and they form 'hanging' terraces or they fill intravolcanic depressions in the Andes. In the mouth of the Azapa Valley, these deposits make up a large part of the substrate of the city of Arica.

- **Colluvial Deposits⁷**

These unconsolidated, chaotic deposits are of gravitational origin and made up of blocks, cobbles, pebbles, sands and silts. They are poorly sorted, locally stratified and with highly variable thicknesses of up to 50 m. They form cones or fans, which are in part alluvial, in short ravines with a great slope (dejection cones) or long mantles on steep slopes (debris slope). In some areas, they are locally strongly cemented by salts.

- **Littoral Deposits⁷**

They constitute current beach deposits and subordinately, old raised beach and terraced deposits. They are distributed along the coast, mostly north of Arica, where they form a belt of up to 1 km wide from the coastline to 20 m a.s.l. These deposits are limited to the east by escarpments created by marine abrasion, formed in the Pliocene and Pleistocene fluvial deposits. These littoral deposits correspond essentially to gray and brown, in part semiconsolidated sands of fine to coarse grain size, which sometimes include centimeter-sized fragments of lithic material and shells. These deposits display a well to moderately defined stratification.

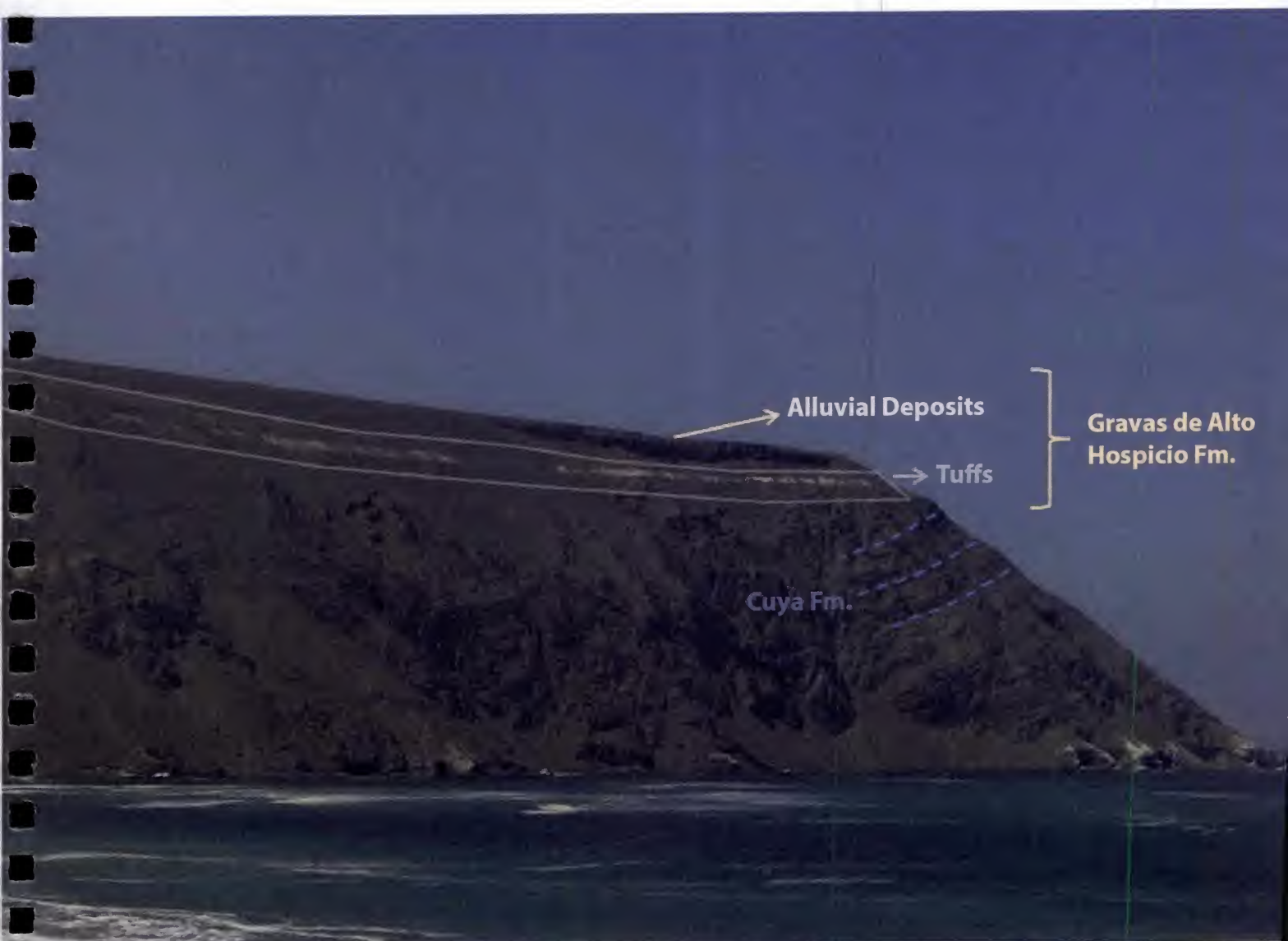
Component 02- Desembocadura de Camarones

The geological units that crop out in this area span ages ranging from the Jurassic to the Holocene periods and are described below (Sheet 25)

- **Cuya Formation¹²**

This unit is made up of a sequence of dark gray, greenish-gray and reddish-brown porphyritic andesites and andesitic breccias with some less frequent porphyritic rhyodacites¹³ and marine sedimentary rocks¹⁴ (Figure 3). Greenish and reddish-brown andesites are found with diclases in some areas. These rocks, along with breccias, display chlorite, epidote and calcite alterations to varying degrees that are directly related to the intrusions that affect them¹³. Based on its stratigraphic position and their fossiliferous content, it is assigned a Middle Jurassic age^{13,14}.

This unit represents a fluctuation between a volcanic environment and marine sedimentary basins restricted in space and time within the volcanic chain. The Cuya Formation is part of an extensive belt of Jurassic volcanic rocks that crop out from Taltal to Arica, it has been interpreted as product of an andesitic continental volcanic arc that limited marine environments to the south and east¹⁵.



- Figure 3: Rocks from the Cuya Formation in angular unconformity with the Gravas de Alto Hospicio Formation. View to north from the mouth of the Camarones River
SOURCE: MODIFIED FROM MANAGEMENT PLAN ⁵

- **Gravas de Alto Hospicio Formation¹⁶**

It corresponds to detrital sedimentary deposits with intercalations of tuffs that fill irregular and isolated depressions present in a large part of the Coastal Cordillera. It appears overlying the Cuya Formation with angular unconformity (Figure 3).

This unit is composed of gravels, sand and sedimentary breccias of fine to coarse grain size, and semi-consolidated brown, light gray and yellow silts. It has intercalations of acid tuffs, tuffites and locally salt layers. The deposits are partially cemented, mostly by halite and carbonate. Its sedimentological characteristics allow interpreting it as product of low thickness flows, subsaturated in water (hyperconcentrated flows), with a preponderance of detrites and subordinately of mud from a proximal and medial alluvial environment, and to a lesser extent of proximal fluvial and colluvial with alluvial reworking¹⁴.

Based on its stratigraphic relationships and radiometric dating performed on the intercalations of tuffs, García and Fuentes¹⁴ assign it an Upper Oligocene - Pliocene age.

- **Terraced Lacustrine Deposits**

These deposits make up a terrace level (T2 in Management Plan⁵) attached to the southern flank of the Camarones Valley. The population of Caleta Camarones' settlement and the archaeological sites of Camarones 14/17, Camarones 8, Camarones 1, 2 and 3 are located on this terrace. In this document this terrace is also called South Terrace.

The unit forms a subhorizontal succession with a minimum thickness of 30 m, whose upper part is a crust that is resistant to erosion, sealing the terraced surface located approximately 500 m a.s.l.^{13,14} (Figure 4). The deposits correspond essentially to light brown and gray silts, siltstones, sands and sandstones with intercalations of peats, gypsum and locally, fine gravels.

Based on the dating performed by Niemeyer et al.¹⁷ on the remains of preceramic occupations found on this terrace, in addition to the compaction of sediments, assigns these deposits a Pliocene age.

These deposits could have accumulated in a continental environment with restricted flow, with sporadic marine influence and local development of vegetation^{13, 14}.

- **Ravine Fluvial-Alluvial Deposits (Holocene-Pleistocene)**

These deposits correspond to a group of blocks and gravels immersed in a sandy to silty matrix. The clasts are angular to subangular with low sphericity (Figure 5). They are found filling ravines and exhibit alluvial-fan morphology at the exits of the valleys (Figure 6).

- **Colluvial Deposits (Holocene-Pleistocene)**

These deposits are made up of semi-consolidated gravels and blocks that are found immersed in a sandy-silty matrix. The clasts are angular with low sphericity (Figure 7). These deposits exhibit poor sorting and appear on hillsides forming inclined levels with a slope similar to that of the hillsides (Figure 8).

- **Terraced Littoral and Anthropogenic Deposits**

These deposits correspond to a sequence of sands and gravels with abundant shell remains (Figure 9). Toward the upper levels shell and garbage remains appear, corresponding to anthropic filling, which span the Archaic, Formative and Late Intermediate periods¹⁸.

These deposits lie over a slightly developed and badly conserved terrace level adjacent to the slope of the coastal cliff (Figure 10). Due to these deposits' morphology, the deposits of non-anthropogenic origin could be correlated to the South Terrace level, which would indicate a Pliocene age. The deposits of anthropic origin would have been deposited later, between 5700 and 800 BP¹⁸.



• **Figure 4a and 4b: Terraced lacustrine deposits (T2-Terraza Sur) on the southern flank of the Camarones Valley**
SOURCE: MANAGEMENT PLAN ⁵



- Figure 5: Section showing fluvial-alluvial deposits on the northern flank of the Camarones Valley
SOURCE: MANAGEMENT PLAN ⁵



- Figure 6: Ravine fluvial-alluvial deposits showing fan morphology. View of southern flank (above) and northern flank (below) of the Camarones Valley
SOURCE: MANAGEMENT PLAN ⁵



- *Figure 7: Detail of colluvial deposits cropping out in the fishing cove area.*
SOURCE: MANAGEMENT PLAN ⁵



- *Figure 8: Colluvial deposits (white arrow) on route to the fishing cove, near the mouth of the Camarones River.*
SOURCE: MODIFIED FROM MANAGEMENT PLAN ⁵



• Figure 9: Terraced littoral and anthropic deposits in the Camarones Sur archaeological site.
SOURCE: MANAGEMENT PLAN ⁵



• Figure 10: View to north of a slightly developed and very badly conserved terrace level attached to the hillsides of the coastal cliff, overlain by the littoral and anthropic deposits.
SOURCE: MANAGEMENT PLAN ⁵

- **Terraced Fluvial Deposits (T3)**

These deposits are a combination of light-colored clays, silts and sands (whitish-brown, light gray and white) that fill the Camarones Valley. These deposits have a terraced morphology that rises 2 to 3 m above the active Camarones riverbed (Figure 11). Radiocarbon dating performed by Sitzia¹⁰ on the sediments that make up this terrace indicate an age between 5000 and 2000 cal BP, allowing the interpretation that this terrace was active during the Chinchorro occupation.

- **Terraced Fluvial Deposits (T4)**

These deposits consist of clays, silts and sands that fill the Camarones valley in areas adjacent to the active riverbed. These deposits have a terraced morphology that rises just a few centimeters above the active riverbed. Due to the former, these terraces flood sporadically, which is evidenced in the form of palaeochannels exhibited on the surface of these deposits, and therefore, they can be considered active deposits.

- **Active Ravine Fluvial-Alluvial Deposits**

These deposits are mainly made up of unconsolidated blocks, gravels and sands (Figure 12). These deposits generally cut through the older ravine fluvial-alluvial deposits (Holocene-Pleistocene), and they are filling the active ravines in the area.

- **Active Littoral Deposits**

These deposits consist of sub-angular and sub-rounded blocks and cobbles, unconsolidated gravels and sands found filling beaches in the study area (Figure 13).

- **Active Colluvial Deposits**

These deposits are made up of unconsolidated gravels and sands, with angular clasts of low sphericity. These are very unstable deposits that create debris slopes, in some cases with a conical shape (Figure 14), that have formed product of sustained soil slides, small rock slides and rockfalls.

Some areas isolated from these deposits have large unstable blocks (with diameters greater than 2m) embedded in finer material (Figure 15).



- *Figure 11: Northeast view of Terraced Fluvial Deposits (T3).*
SOURCE: MANAGEMENT PLAN ⁵



- *Figure 12: Active Ravine Fluvial-alluvial Deposits in the northern flank of the Camarones Valley.*
SOURCE: MANAGEMENT PLAN ⁵



- *Figure 13: View to north from the fishing cove area of the Active Littoral Deposits.*
SOURCE: MANAGEMENT PLAN ³



- Figure 14: Active Colluvial Deposits (on the right side of image) on route to the fishing cove.
SOURCE: MANAGEMENT PLAN⁵



- Figure 15: Block of more than 2 meters in diameter (blue arrow) that is part of the Active Colluvial Deposits in the fishing cove area.
SOURCE: MANAGEMENT PLAN⁵

- **Structures**

In the area of the mouth of the Camarones River, there are geological structures like scarps and geological faults.

The scarps are associated mainly to terraced morphologies. The edges of South Terrace (T2) and the T3 fluvial terrace are particularly marked product of the fluvial erosion that has affected these morphologies.

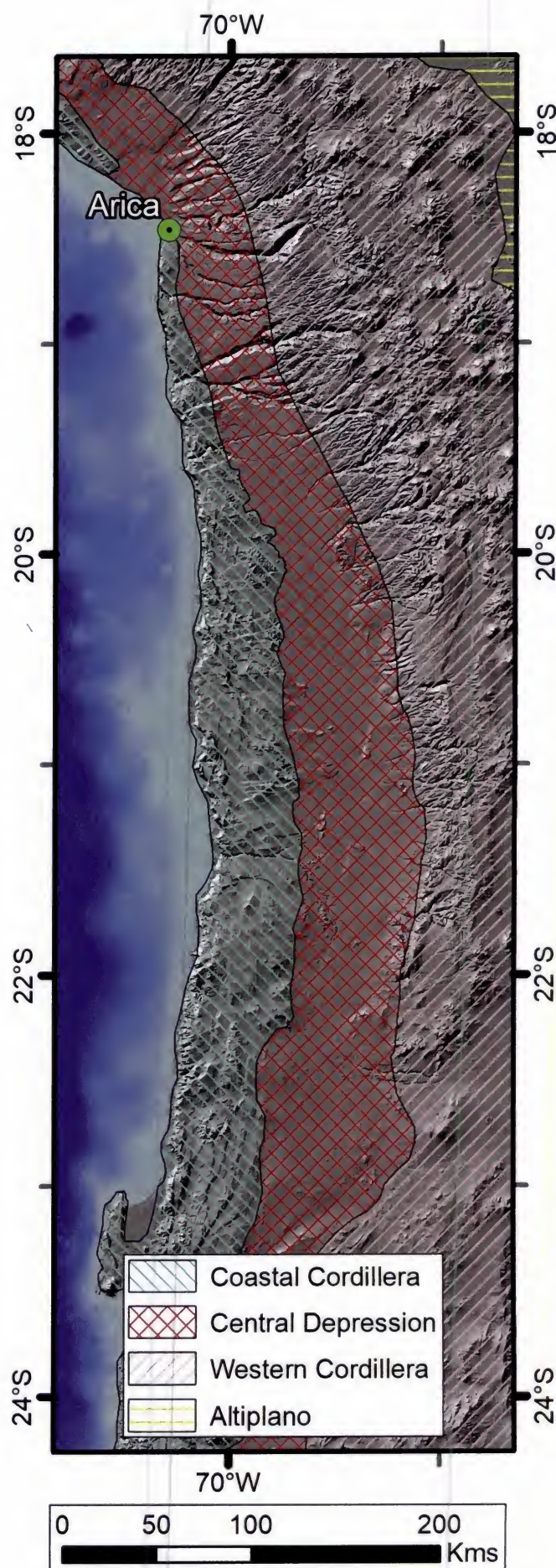
The principal fault system known within the area is a group of NNE and ENE faults¹³. These faults have pseudo-rectilinear traces that extend, in some cases, 20 km. According to Muzzio¹³, the movement along these faults would be vertical and transcurrent, just as it occurs in the Camarones Fault belonging to this group, whose movement is sinistral.

Another important group of faults corresponds to the N-S faults¹³, where post-Miocene activity is recognized since it affects tuff flows and anhydrite elaboration deposits assigned to that age. The recent activity of these faults is confirmed by the existence of the Camarones 14 Fault¹⁷, which corresponds to a fault that affects archaic cultural deposits.

Geomorphology

The main geomorphological units that make up the Chilean continental margin north of 27°S, from west to east, are the Coastal Cordillera, Intermediate or Central Depression, the Western Cordillera (Andean Cordillera) and the Altiplano. Further east is the Eastern Cordillera, followed by the Sierras Subandinas (Figure 16). The Western Cordillera and, to a lesser extent, the Altiplano and Eastern Cordillera are the units with the currently active volcanic arc.

The study area is located on the western flank of the Coastal Cordillera, where, in addition, it is possible to distinguish other smaller scale geomorphological units, like valleys, marine terraces and fluvial terraces.

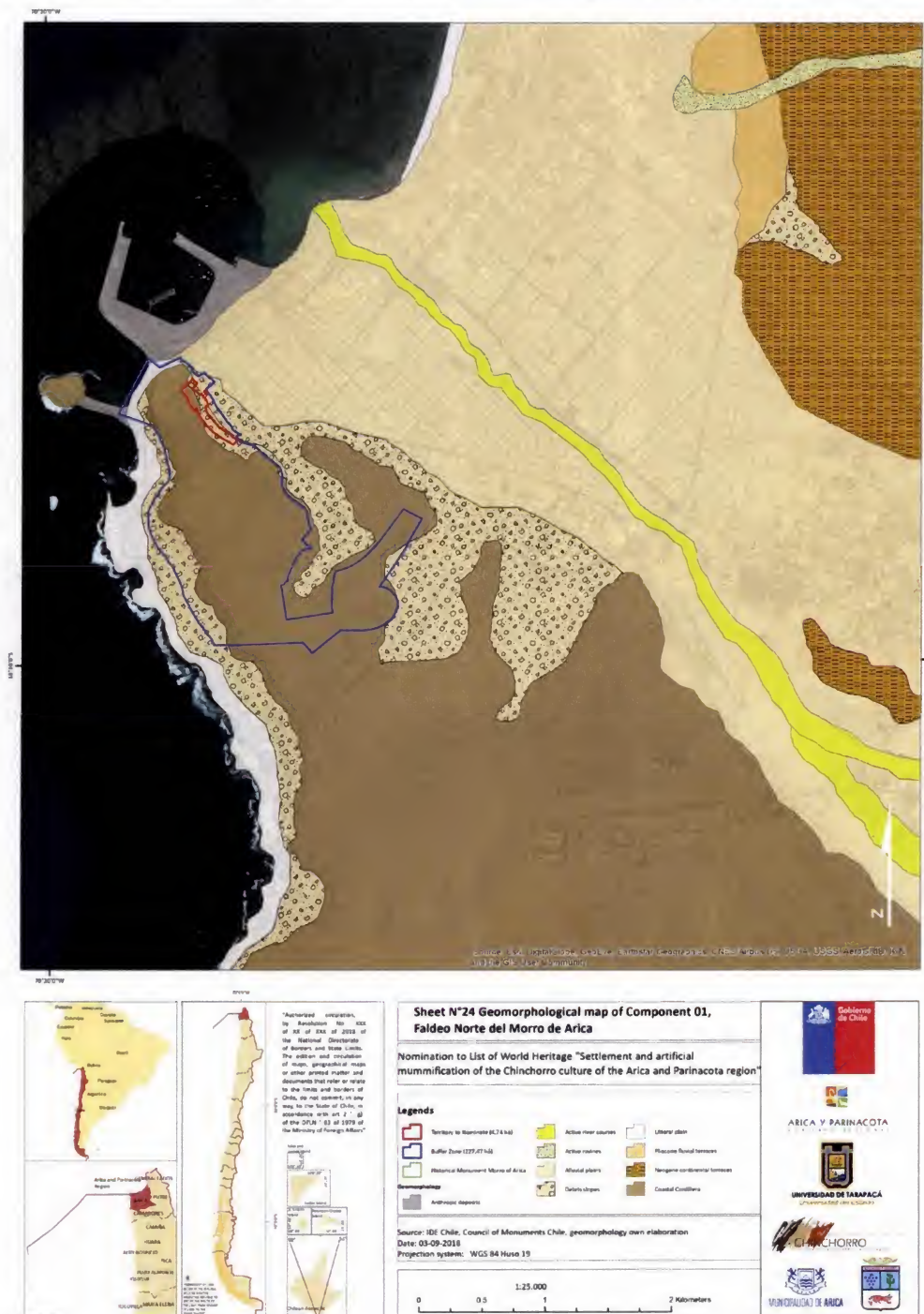


• *Figure 16: Distribution of the main morphotectonic structures of the Andes in northern Chile.*
SOURCE: OWN ELABORATION BASED ON MPODOZIS Y RAMOS¹⁹

Component 01- Faldeo Norte del Morro de Arica

At a local level, it was possible to identify four main geomorphological units in the city of Arica (Sheet 24), which are described below.

1. **Coastal Cordillera:** This part of the Coastal Cordillera is a mountain range with increasing elevations towards the south. This unit includes Morro de Arica, a hill that reaches elevations of nearly 200 m a.s.l. Elevations increase toward the south, reaching elevations of 600 m a.s.l. north of Caleta Vitor.
2. **Neogene continental terraces:** These plains have elevations of 300 to 400 m a.s.l., located east of the city of Arica.
3. **Plio-Pleistocene alluvial terraces:** These terraces are elevated plains associated to two rivers, the San José and Lluta, that cross the city of Arica (Sheet 24).
4. **Littoral plain:** It appears as a land belt parallel to the coast and its width increases to the north, reaching 250 to 300 m in the northern part of the city, south of the mouth of the Lluta River.

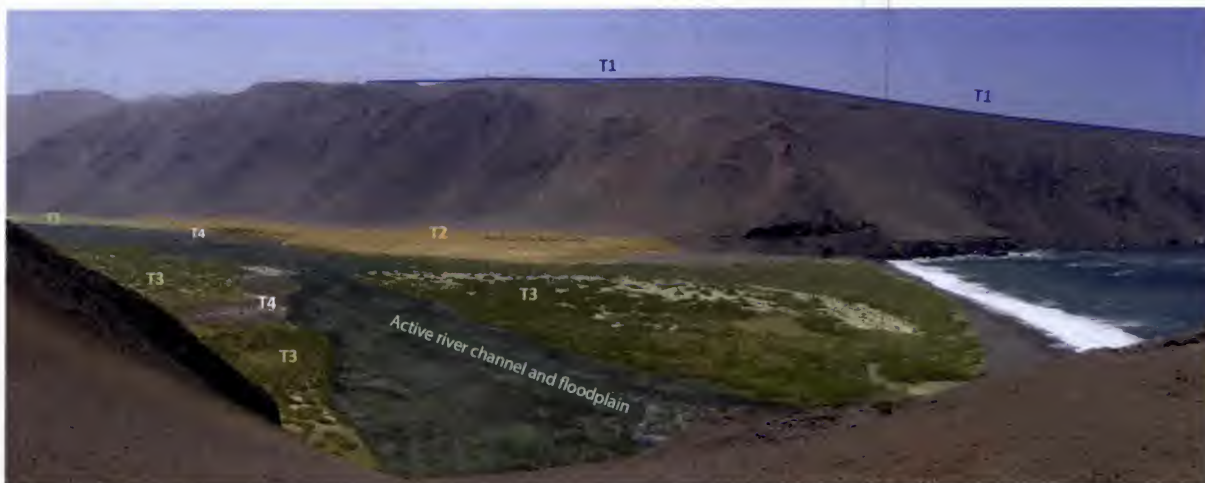


- Sheet 24: Geomorphological map of Component 01, Faldeo Norte del Morro de Arica.

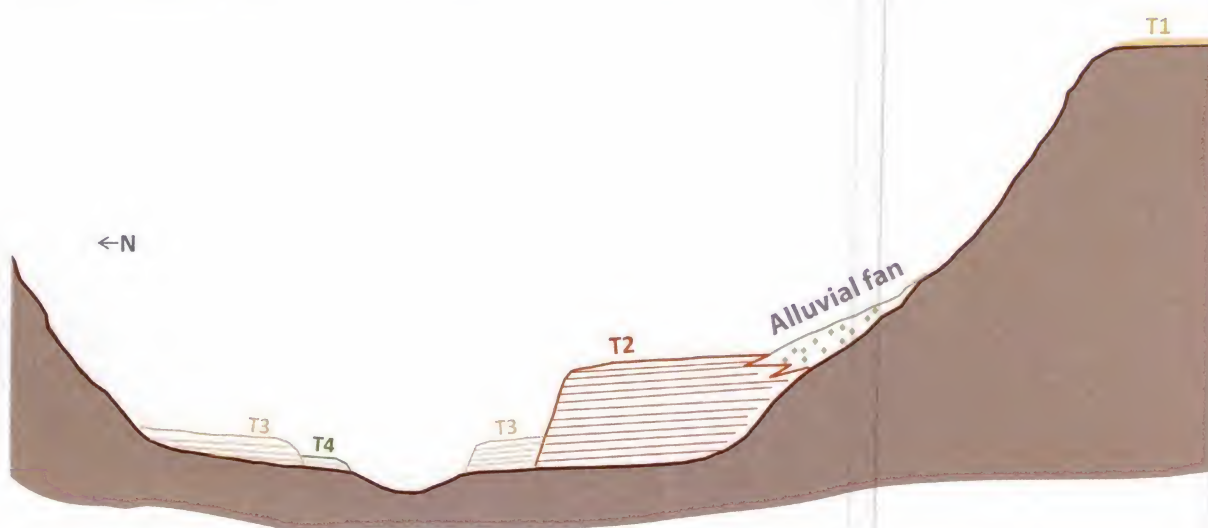
Component 02-Desembocadura de Camarones

In the area of the mouth of the Camarones River, four terrace levels have been identified, that in order from oldest to youngest correspond to T1, T2, T3 and T4 (Figure 17, Figure 18).

- T1 is a terrace of marine origin that was subsequently filled with alluvial deposits. This is the highest terrace in the area, with heights that fluctuate between 470 and 640 m a.s.l.
- T2 (Southern Terrace) is a terrace found attached to the southern flank of the Camarones Valley. Its elevations vary between 30 and 50 m a.s.l. To the north, it is cut by the incision associated to the Camarones Valley and toward the south and southeast, it interdigitates with alluvial deposits from the valleys.
- T3 and T4 correspond to younger and lower fluvial terraces, being T3 the most developed. T3 has heights of 3 to 4 m above the active Camarones River's riverbed, while T4 rises only a few centimeters over the current riverbed.



• Figure 17 Terraced levels in the area of Desembocadura de Camarones (view to south from the Punta Norte site).
SOURCE: MANAGEMENT PLAN ⁵



• Figure 18: Schematic north-south section of Desembocadura de Camarones showing different terraced levels.
SOURCE: MANAGEMENT PLAN ⁵

2.a.ii. Natural Environment

Component 01-Faldeo Norte del Morro de Arica

The area surrounding the Faldeo Norte del Morro de Arica is located in the southern part of the city of Arica. This urban area is near coastline, valley and ravine environments (San José River Valley). The western and southwestern flank of the Morro de Arica has a more abrupt morphology forming coastal cliffs. These environments are important for the biodiversity of the region given that, at a regional level, there is a high degree of endemism associated to the high parts of the coastal cliffs and rocky areas from some of the hills near the sea²⁰.

The former Alacrán Island, located in front of Morro's western flank, is an area where species of migratory and resident birds concentrate. A great number of seagulls, sanderlings (*Calidris spp*) and even marine otters (*Lontra felina*) inhabit this area, which before being connected to the continent housed a colony of different species of guano-producing birds, and even Humboldt penguins (*Spheniscus humboldti*). Today, the former island is still occupied by different species of birds, like little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*) and blackish oystercatcher (*Haematopus ater*). In the area surrounding Morro de Arica, there are records of birds of prey like the peregrine falcon (*Falco peregrinus*)²¹.

Neither in the area of the Property's component nor in the buffer zone of Faldeo Norte del Morro de Arica are there areas protected by the Ministry of the Environment's National Register of Protected Areas.

Component 02- Desembocadura de Camarones

This area encompasses a river mouth environment and a valley and ravine environment. The site was declared Priority Site for Conservation in 2001 (Regional Strategy of Biodiversity). This declaration of priority site includes the mouth of the river (protected area code in the national register SP2-113) and the Camarones Valley sector (protected area code in the national register SP2-110³).

Regarding the "Desembocadura de Camarones" priority site, the Strategy and Action Plan for conservation in the Arica and Parinacota region indicates that there is no systematic information on biodiversity for the site, however, the importance of the area as a feeding location and a gathering place for aquatic birds should be researched, it being highly probable that it is comparable in terms of importance to the mouth of the Lluta River. It is also a remarkable area with migratory birds and freshwater prawns (*Criphiops caementarius*)²². For the "Quebrada de Camarones" priority site, the information available indicates that it corresponds to an area of steep ravines, which encourages the presence of falconiforms, foxes and lesser grison (species with a very small population in the region) and stands out for representing a biological corridor and for its concentration of flora²².

• Flora and Vegetation

In the study done within the framework of the Management Plan⁵, five dominant species of flora were identified (Table 1), with four of them belonging to the shrub stratum (nanophanerophytes) and the rest corresponds to herbaceous perennials (hemicryptophytes). All of the plants recorded in the mentioned study are native and none of them are endangered. The majority of species are found in the valley, in proximity to the riverbed. Two of them are found in the wetland area (*Typha dominguensis*, *Scirpus americanus*) and two in areas with shrubs (*Tessaria absinthioides*, *Atriplex atacamensis*). Salt grass (*Distichlis spicata*) was identified near the wetland as well as in the beach area.

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS	GEOGRAPHIC ORIGIN
Brea, Soroma, Chilquilla	<i>Tessaria absinthioides</i>	Out of danger	Native
Grama Salada	<i>Distichlis spicata</i>	Out of danger	Native
Junco	<i>Scirpus americanus</i>	Out of danger	Native
Pillalla	<i>Atriplex atacamensis</i>	Out of danger	Native
Totorá	<i>Typha latifolia</i>	Out of danger	Native

• Table 1: Vegetation species identified in the area of Desembocadura de Camarones.
SOURCE: MANAGEMENT PLAN ⁵

- **Fauna**

The fauna in the area of Desembocadura de Camarones includes terrestrial vertebrates, birds and marine mammals⁵. Among noteworthy species are South American fur seals (*Arctocephalus australis*) and there are records of other species being sighted on site during the study done within the framework of the Management Plan⁵ (Table 2).

According to Mella²², a relevant characteristic of these areas is that many species of terrestrial vertebrates, although not endemic to Chile, have a very restricted geographic distribution within the country (in many cases only limited to this region). That is the case of Schmidt's green racer (*Philodryas tachymenoides*), a snake, Kalinowski's mastiff bat (*Mormopterus kalinowskii*), and birds like the Peruvian thick-knee (*Burhinus superciliaris*), Peruvian sheartail (*Thaumastura cora*), Chilean woodstar (*Eulidia yarrellii*), vermilion flycatcher (*Pyrocephalus rubinus*), cinereous conebill (*Conirostrum cinereum*), tamarugo conebill (*Conirostrum tamarugense*), chestnut-throated seedeater (*Sporophila telasco*), band-tailed seedeater (*Catamenia analis*), slender-billed finch (*Xenospingus concolor*) and hooded siskin (*Spinus magellanica*)⁵.

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS AND PROTECTION CRITERIA	GEOGRAPHIC ORIGIN
REPTILES (2 species)			
<i>Microlophus theresioides</i>	Corredor de Teresa	Rare	Endemic
<i>Microlophus quadrivittatus</i>	Four-banded Pacific Iguana	Insufficiently known	Endemic
BIRDS (11 species)			
<i>Phalacrocorax gaimardi</i>	Red-legged cormorant	Insufficiently known	Native
<i>Phalacrocorax brasilianus</i>	Neotropic cormorant	Out of danger	Native
<i>Haematus palliatus</i>	American oystercatcher	Out of danger	Native
<i>Haematus ater</i>	Blackish oystercatcher	Out of danger	Native
<i>Numenius phaeopus</i>	Whimbrel	Out of danger	Native
<i>Larus modestus</i>	Grey gull	Vulnerable	Native
<i>Larus dominicanus</i>	Kelp gull	Out of danger	Native
<i>Athene cunicularia</i>	Burrowing owl	Out of danger	Native
<i>Pygochelidon cyanoleuca</i>	Blue-and-white swallow	Out of danger	Native
<i>Troglodytes musculus</i>	House wren	---	Native
<i>Cathartes aura</i>	Turkey vulture	Out of danger	Native
MAMMALS (1 specie)			
<i>Abothrix olivaceus</i>	Olive grass mouse	Out of danger	---

- **Table 2: List of species seen in the field during Management Plan study 5.**
SOURCE: MANAGEMENT PLAN ⁵

2.a.iii. Definition of Polygons / Nominated Property

The criteria used in delimiting the polygons of the Property's components is explained here.

Component 01, Faldeo Norte del Morro de Arica. (Sheet: 5,7,9,11)

- **Colón 10 Site Museum**

The museum's site and the building itself were used as criteria for the polygon.

- **Faldeo Norte del Morro de Arica Site**

The same criteria used to generate polygon of the site during the 2014 Management Plan, called Sitios Morro Mo 1, Mo 1/5 and Mo 1/6, was utilized again. Based on this initial polygon it was adjusted and modified as follows:

A-B, Héroes del Morro Street

B-C, property limit

C-D, property limit

D-E, line projected 175 meters from Patricio Lynch Street

E-F, parallel line 95 meters from Héroes del Morro Street

F-G, Entry road to the Morro

G-H, Entry road to the Morro

H-I, line projected 48 meters from point J to I

I-J, property limits

J-K, projection of property limit

K-L, property limit

L-A, Cristóbal Colón Street

- **Faldeo Norte del Morro de Arica buffer zone**

For the buffer zone, the following was considered:

Polygon from Morro de Arica's declaration as a Historic Monument.

Enlarging of polygon in the northeastern sector, Condell Street, el Morro Street, Bolognesi Street, Yungay Street, Colón Street, Morro alley, up to Héroes del Morro Street.

COMPONENT	COMPONENT	COMPONENT
01. Faldeo norte del Morro de Arica	Faldeo	Morro 1 (tank sector)
		Morro 1/5 (sector called Reserva 1)
		Morro 1/6
		Mirador La Virgen
		Reserva 2 1
	Colón 10 Site Museum	Colón 10

• Table 3: Component 01. Faldeo Norte del Morro de Arica: confirmed sites.

Component 02 - Desembocadura de Camarones (Sheet 6,8,10,12)

Geomorphological criteria were used in order to include the terraces and hillsides where the occupation occurred.

The geomorphological criteria aim to include the environmental context in which the occupation took place, yet it does not mean that the geomorphological features have heritage value in of themselves.

- **The geomorphological features that were included in the Property are the following:**

- Terraza Sur (T2 in Management Plan), because this is where the Camarones 1, 2 and 3, Camarones 8 and Camarones 14/17 sites are found. The formation of the terrace occurred before the occupation, therefore, it currently has an environmental context similar to the one that existed during the occupation.
- The river's lower terrace (T3 in Management Plan, 2013). This terrace was included because, according to the dates obtained in Sitzia's 10 geoarchaeological report, this terrace corresponds to what used to be the riverbed and its floodplain during the occupation.
- The current riverbed and floodplain, because it contextualizes the river mouth and fluvial valley environments in which the occupation developed.
- Sectors of hillsides and alluvial fans on the northern flank (of the river), due to the presence of the Punta Norte sites and other later archaeological sites. Camarones 12 and other sites mentioned in the Management Plan, 2013.
- Debris slopes (colluvium) and littoral plains at the Southern Cliff. The Camarones 15-a,15-b, 15-c, 15-d, 15-e sites and other later archaeological sites are found there.

- **Desembocadura de Camarones buffer zone:**

For the buffer zone, the following was considered:

All hillsides contiguous to the Property up to the water division line or to the limit of the high slope zone.

A strip of land upstream from the Property that encompasses part of the riverbed, its terraces and contiguous hillsides.

A strip 80 m into the sea along the Property and around its buffer zone on land.

1 Although the Reserva 2 sector is part of the Property, this name was assigned while the Universidad de Tarapacá (UTA) applied for a free land concession from the Ministry of National Assets, and it does not correspond to an archaeological site.

COMPONENT	COMPONENT	COMPONENT
02. Desembocadura de Camarones	South Terrace	CAM-1
		CAM - 2
		CAM-14/ CA/17
		CA/8
	South Cliff	CAM-S
		CAM15-A
		CAM 15-B
		CAM 15-C
		CAM 15-D
		CAM 15-E

• Table 4: Component 02. Desembocadura de Camarones: confirmed sites.

2.a.iv. The Chinchorro Culture

The Chinchorro Culture's settlement, on the coast of northernmost Chile, constitute a unique and exceptional testimony to a society that has disappeared, conserving attributes that denote their ways of life and a vision of transcendence toward death.

The exceptional feature developed in this settlement is funerary art, characterized for being the oldest archaeological records of artificial mummification of bodies in the history of humanity (7000 AP). The settlements of the Chinchorro cultural groups conserve records *in situ* that denote practical knowledge of artificial mummification and its socioeconomic and symbolic context. This practice, that endured 4000 years is still recognizable today through investigated archaeological sites, stratified deposits, and material and human vestiges.

The complex Chinchorro funerary art is unique due to its age and because it manifests in the context of a fishing, hunting and gathering, and marine foraging society, quite simple in terms of its forms and means of production. It is also remarkable that the bodies' complex treatment was done mainly to unborn, neonatal and infant children, aside from a few exceptions.

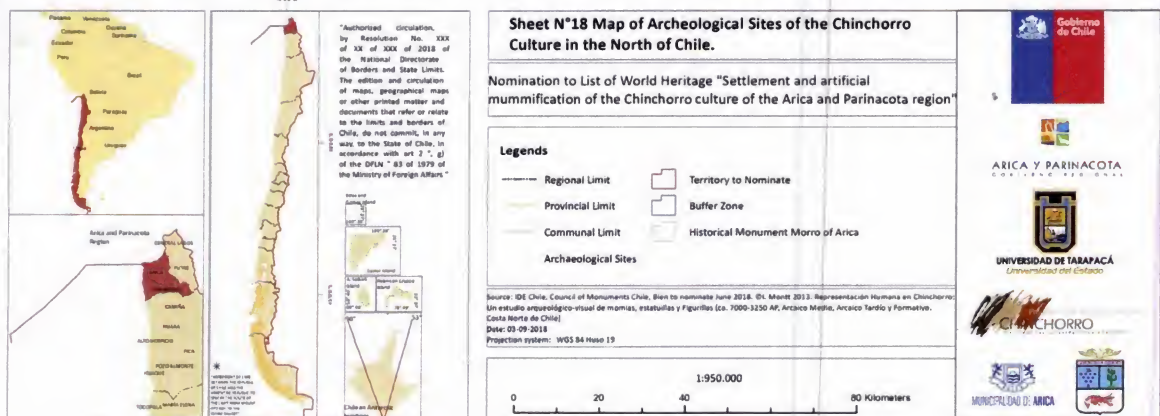
The name these fishing, hunting and gathering groups knew each other as has been lost in time. They were first called "Aborígenes of Arica"¹ and were subsequently denominated Chinchorro complex, tradition or culture²⁻⁵. This name corresponds to the area where the German archaeologist, Max Uhle, carried out his initial findings. These findings are located in Pampa Chinchorro, an interfluvial terrace near the San José de Azapa River and also to the coast. The name *Chinchorro* is used commonly to refer to:

"netbags made with vegetal fiber featuring a looped narrow stick at the top, used to carry the fishing and shellfish collecting gear. The bag size is very small (about 12 cm long), which was one of the observations that led Uhle to insist on the primitiveness of the group"^{6,7} (Figure 19a and 19b).



• Figure 19a and 19b: Bone artifacts (chopes) to gather mollusks and net bag (Chinguillos).
SOURCE: STANDEN AND ARRIAZA 2014 :42 FIG. 6 and 7

The spatial distribution of the Chinchorro groups, along the course of their history, extends from the locality of Arica (Macarena archaeological site) to the locality of Iquique (Patillo archaeological site). It encompasses the marine strip on the fertile or exorheic coast, as well as the absolute arheic coastal desert environment, known also as interfluvial desert coast (located between Pisagua and Chañaral), (Sheet 18)⁸. In this last habitat, human presence was only possible due to the existence of freshwater springs⁹.



• Sheet 18: Map of Archeological Sites of the Chinchorro Culture in the North of Chile IM201.
ADAPTED FROM UTA 2014 :11 FIG.1

A settlement that unquestionably belongs to the Chinchorro cultural tradition is located in Arica and Camarones. In addition to the former, diagnostic occupations, but of a more discrete character, in southern localities like Pisagua and Iquique, are also included.

However, further research is required on sites found in the southern coast of Peru, to the north, and in the mouth of the Loa River, to the south, for they effectively constitute manifestations attributable to the Chinchorro cultural tradition^{5,10-13}. Mortuary features consisting of the intervention of individuals' faces with clay and inhumations in an extended position, in addition to the recognition of artifacts associated with marine exploitation, have allowed some researchers to propose the presence of the Chinchorro cultural tradition in areas of the southern coast of Peru, like Ilo (e.g. Kilómetro-4 site), or the mouth of the Loa River in northern Chile (e.g. Caleta Huelén-42 site)^{10,14-16}. Nevertheless, the synchronicity of occupations, the general similarities in the artifactual material, the presence of shell fishing hooks in some contexts, the extended position of the inhumations and the complex treatment of the dead reminiscent of the Chinchorro cultural tradition do not constitute sufficiently discussed indicators so as to establish resolute affiliation between sites, a same settlement system and a same cultural tradition as is the case of the Chinchorro¹⁷.

The Property is located in the Arica and Parinacota region (17° - 24° S Lat. and 70° - 71° W Long.), in northernmost Chile, and possesses two components: 01 Faldeo Norte del Morro de Arica y 02 Desembocadura de Camarones, located in the municipalities of Arica and Camarones, respectively. In both cases, there are large areas of archaeological deposits product of continuous human occupation by the Chinchorro tradition as well as other cultural groups. These occupations occurred from the Early Archaic Period until times of Inca influence in the region (ca. 7420 - 550 BP)^{18,19}.

The components that make up the Property and the scientific intervention of these components carried out in a century of research have provided archaeological and bioanthropological evidence that has made the study and recognition of the Chinchorro society possible through the nearly one hundred, national as well as international publications and dozens of research projects. Moreover, the work of conservation in museums, complementary to the former, has preserved the remains extracted during archaeological endeavors for their study, for the purpose of future analysis.

Both components of the Chinchorro settlement, Faldeo Norte del Morro de Arica and Desembocadura de Camarones, constitute a cultural area highly representative of this cultural tradition. Its most relevant and characteristic features are evidenced in this territory. The environmental context in both components, although to a greater degree in Camarones, preserves attributes that indicate the way in which this interfluvial coast has been inhabited for at least 7400 years in one of the driest deserts in the world²⁰ (Figure 20).



• Figure 20: Extreme desert in interfluvity sector.
SOURCE: MANAGEMENT AND PROTECTION CHINCHORRO SITES PLAN

Faldeo Norte del Morro de Arica and Desembocadura de Camarones make up the core area of the settlement and occupations of fishing, hunting and marine gathering Chinchorro groups in the fertile coast of the Atacama Desert between ca. 7400 and 2800 BP, spanning the Early, Middle and Late Archaic periods in addition to the Early Formative Period.

Desert, Rivers and Coast: Habitat of the Chinchorro Groups

The Property is made up of spaces where Chinchorro groups established an equilibrium with the desert environment, which perhaps made their complex forms of expression possible⁸.

The material vestiges of the Chinchorro cultural tradition are found in the northern part of the Atacama Desert, located between 18° and 27° S, which has a varying coastal strip. In this arid setting, access to water for human consumption depends primarily on the rain in the Andes. Thus, in the Altiplano, clouds loaded with humidity from the Amazon Basin linger in the heights of the Andes (of up to 6,000 m.a.s.l.), causing seasonal precipitations that occur in the summer months (December to March). This phenomenon is known as *invierno altiplánico* 'Altiplanic winter' among the contemporary population. This rainfall is the source of supply for the scarce but essential watercourses in the region, which form valleys, oases and springs that descend the Andean slope. In the river mouth areas, rainfall occurs mainly in the winter season and has a positive relationship with El Niño events (ENSO, El Niño Southern Oscillation), hence, the heaviest pluviometric events happen in years that this phenomenon is present²¹. See Annex 1: Dated archaeological sites²².

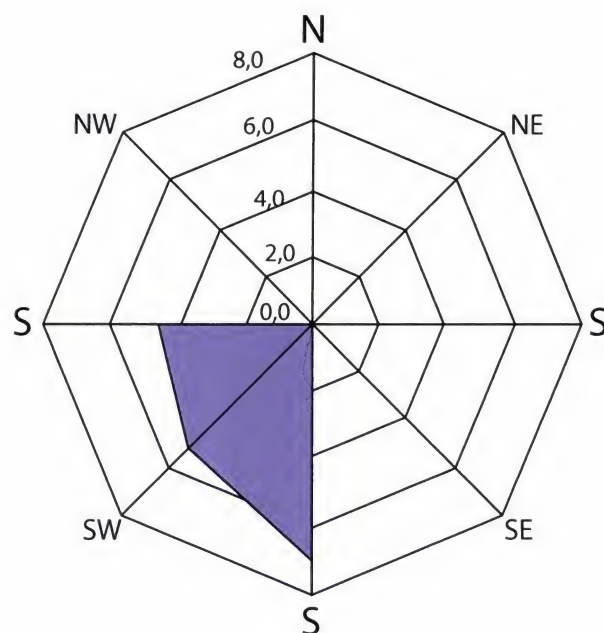
Part of the settlement of the Chinchorro cultural groups is located on the arid coast of valleys and ravines, also known as exorheic or fertile coast, that spans between Arica and Pisagua (18°28' - 19°35' South Latitude). This area corresponds to a region where watercourses originate in the Andes Mountains and drain to the ocean, like is the case of the Lluta River, or they reach the coast only when the supply of water from the Andes is enough, like the Azapa or San José River, the Chaca or Vitor River, the Camarones River and the Tana or Camiña River²³. All of them are located in river canyons that make access to the hinterland possible.

The aridity of this desert space determines an inhospitable habitat for human occupation except near sources of freshwater, which circumscribe to watercourses and springs that surface in the Coastal Cordillera^{9,24}. It is around these areas of available freshwater, critical for human occupation, where the Chinchorro settlement concentrated.

The desert environment is consequence of the Humboldt Current, which has been a prodigious source of food for millennia^{6,24}. The coastal wealth contrasts to the east with the hyperarid core of the Atacama Desert, with almost null precipitation, restricting the availability of water to specific points. However, at the time of the emergence of the Chinchorro cultural tradition, there were better access conditions to this resource. Specifically, around 7800 - 6700 BP, a greater amount of precipitations was registered in the Andes Mountains, which would have determined a satisfactory availability of water in springs and watercourses²⁵.

In the coastal sector, located in the South American tropical desert zone²⁰, one of the most arid in the world, areas surrounding river mouths are remarkable because that is where littoral and alluvial plains reach their greatest development, forming flats that interrupt the abrupt relief of the Coastal Cordillera. These flats are known as river mouth zones of efficiency, where marine and river resources combine in an environment able to provide stability and security to populations^{26,27}. These areas include beaches, rocky shores, wetlands and in contrast, interfluvial plains, sandy slopes and terraces. Since the first Chinchorro occupation, the wealth generated by these complementing habitats played a significant role in the cultural definition of their settlement, where the locus chosen for the development of their every day and ritual life is evident today in the considerable and visible presence of camps, cemeteries and diverse activity areas⁸.

The location of the Property in the geographical context that has been described has particularities that bestow value to the unique conditions of a habitat between exposure and shelter. Thus, within the determining cultural options and decisions of the settlement, there is a recognizable predilection among the Chinchorro to establish their activities on hillsides or terraced slopes in the southernmost areas of the mouth of the river, on the Coastal Cordillera, occasionally near springs, like Quiani⁹. These ancient inhabitants found, within this space, a place with an exceptional panoramic view of the coast and inland to the valley. The geomorphological conditions of the foot of the Cordillera and terraced slopes chosen by the Chinchorro groups provides protection from the predominating SW winds, causing these winds in some areas to slide down the occupied slopes moving west to east, like a breeze (Figure 21)²⁸.



• Figure 21: Wind Rose for the city Of Arica.
SOURCE: PM MORRO 2012 :33 FIG. 11

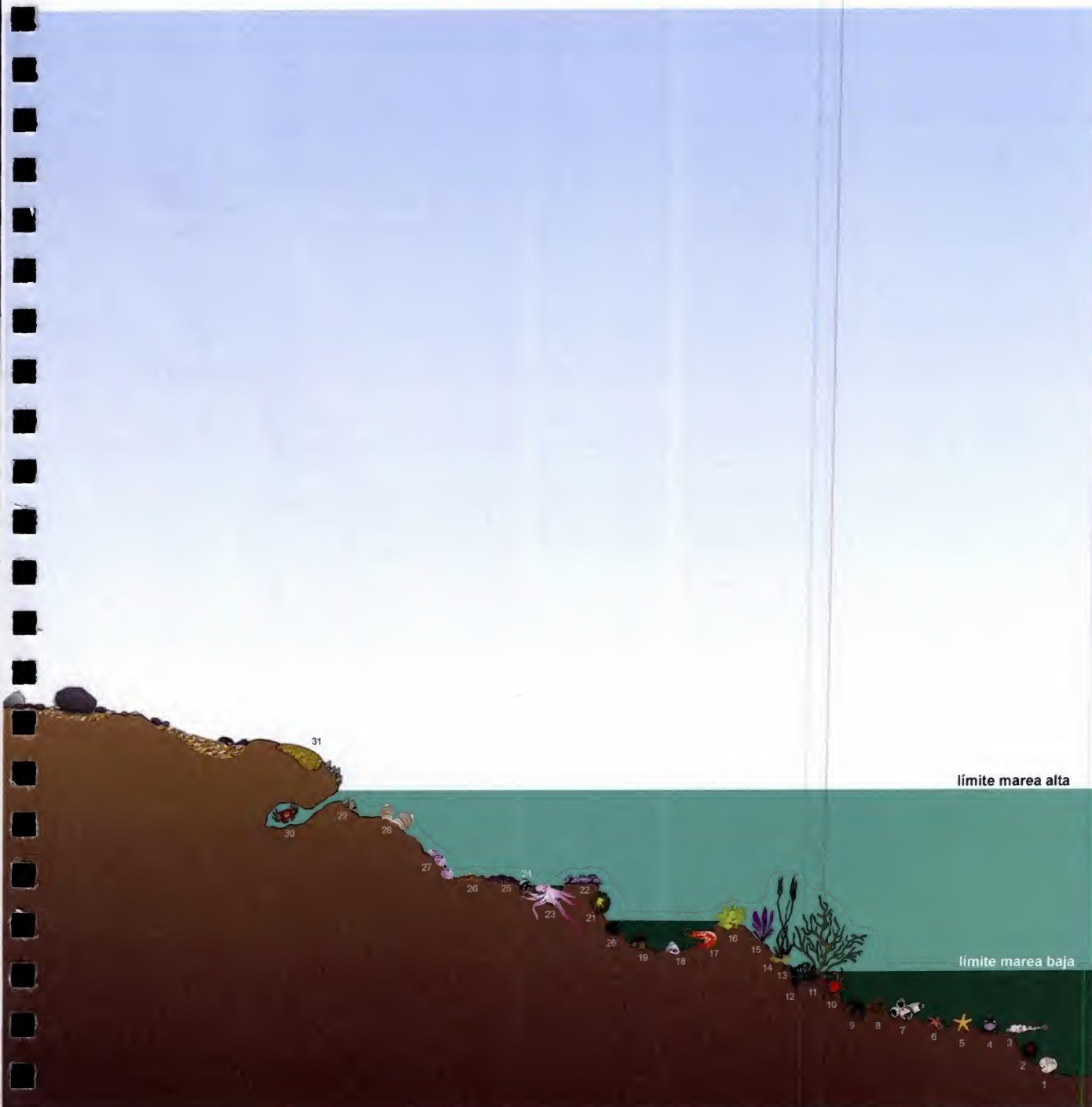
A greater abundance of *camanchaca* (coastal fog) during the winter months favors the development of seasonal *lomas* and *jaral* coastal vegetation. This vegetation, besides being in some cases apt for human consumption, provides sustenance for varied fauna, making this area of valleys and hills from the Coastal Cordillera a propitious hunting area.

On the coast, there is also thermal inversion caused by the cold waters brought by the Humboldt Current. These waters maintain the lower layers of air cold, impeding the formation of high clouds capable of precipitation. Thus, the Atacama Desert meets the Pacific Ocean along steep hillsides that fall abruptly into the sea. It is an arid landscape subject to the influence of an abundantly overcast coastal desert climate: homogeneous temperatures, with low thermal oscillation, loaded with morning fogs and cloudiness, but with scarce rain. The Chinchorro settlement is currently located on a coast of these characteristics, in the northern sector of Faldeo del Morro, in the city of Arica and in the Desembocadura de Camarones, in the *valley* that shares the same name⁸.

In terms of the environmental conditions during the span of the Chinchorro cultural tradition, it has been indicated that the arid coast presented, in general, stable conditions in terms of predictability and abundance of subsistence resources¹³. The aforementioned seems not to have been affected by the oscillations of the coastline determined by a rapid rising of the sea level until 6000 BP, when it was fixed at present level, giving rise to human occupations of greater demographic load and spatial coverage¹³. Maximum rise in sea level, in absence of simultaneous rise of the coast, would have meant the disappearance of ancient occupations that could have been on the affected fossil beaches^{13,29}. At the same time, the rises in sea level would have produced the disappearance of a mobility axis along the coast apt for humans, with the consequent difficulty for the inhabitants¹⁶.

Within the arid nature of this zone, in the last 10,000 years, there have been diverse periods of greater humidity alternating with drier periods^{20,30}. Towards 5000-4000 BP, more intense and frequent ENSO (El Niño Southern Oscillation) have been verified, that would have provoked a negative effect on the amount of water that fell on the western Andean spring and from there, on the resources dependent on the fluvial flows that drain to the Pacific Ocean¹³.

For the Chinchorro groups the appeal of a maritime landscape resides in its high and predictable availability of resources. The natural resources provided by the sea allowed them to intensify production through the development of a coastal-marine economy¹⁶, based on fishing, and marine gathering and hunting. The variety of products that could be extracted from the sea was the basis of subsistence these populations counted on to overcome the limitations imposed by the Atacama Desert. The Humboldt Current was a determining factor in these environmental conditions. The upwelling of its cold waters leads to an increase in nutrients in the surface that sustain a broad diversity of species in the local marine ecosystems. (Figure 22)³¹ Chemical reconstructions of the Chinchorro diet confirm the consumption of an elevated percentage of products of marine origin, specially mollusks and fishes⁸.



• Figure 22: Intertidal food resources.
SOURCE: STANDEN AND ARRIAZA 2016 :48-49.

Therefore, one of the most characteristic features of the Chinchorro fisher-hunter-gatherer occupations are shell middens, refuse deposits and shell refuse, which in some sites are several meters deep, visible in archaeological sites like Camarones 15⁸ (Figure 23)³². This kind of occupations are highly visible, almost monumental, and endow the landscape with a trace of millennial human intervention. In relation to fishing, it has been observed that the majority of the different species of fish could be captured from the coast, without requiring watercraft¹⁸.



• *Figure 23: Shell Midden in Acantilados Sur, Desembocadura de Camarones.*
SOURCE: ARRIAZA AND STANDEN 2016 :336 FIG.1³³

From the archaeological research it is possible to note that the record of terrestrial mammals is very small^{8,34}. However, there are records of hunting tools, a secondary activity in terms of subsistence, but apparently significant in symbolic terms³⁵. The animals that were hunted were mainly diverse birds, sea lion and occasionally stranded cetaceans, because the Chinchorro did not have the means to move offshore. Terrestrial mammals like camelids (*guanacos*) and rodents were scarcely consumed as food (Figure 24 and 25).



• Figure 24 :Recreation of a slaughtered sea lion.
SOURCE: MUÑOZ AND LAGOS 2016 : 69 FIG. 4C³⁶



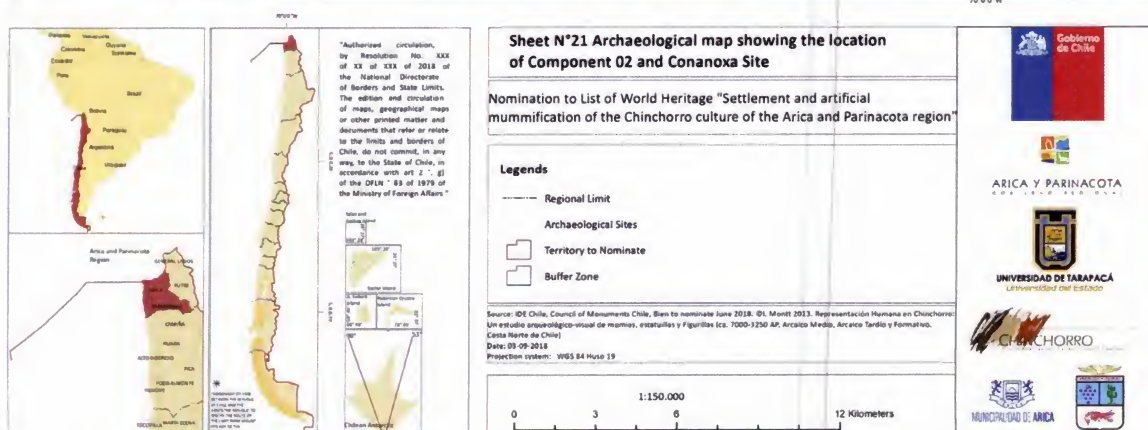
• Figure 25: Birds from the wetland at Desembocadura de Camarones (R.Peredo).
SOURCE: SANTORO ET AL. 2016 :90-91 FIG. 3³⁷

In river mouth environments, an important diversity of species is generated when good irrigation conditions exist, forming wetland areas, locally known as *chimbos*. In them it is possible to find abundant swordgrass and southern cattails, the main components of the diverse Chinchorro textiles. The characteristics of these wetlands can still be seen today in specific areas north of the city of Arica, and in Camarones, in a space with little intervention and closely associated to the remains of the Chinchorro occupation.

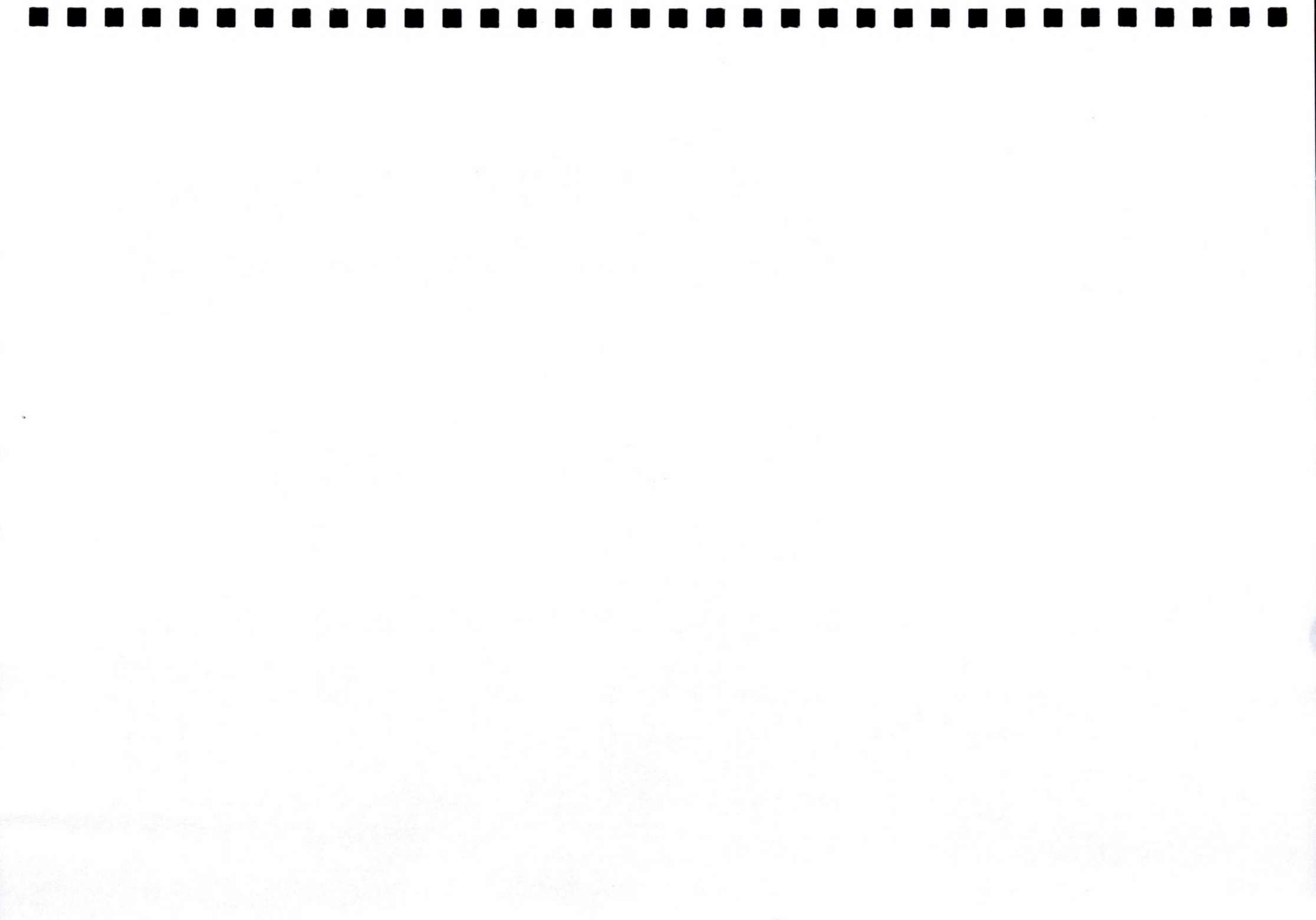
It is worth noting that occupations contextualized within the Chinchorro cultural tradition, as well as those that followed, demonstrate a tendency to connect the coast with the intermediate valleys, originating mobility circuits that allowed the configuration of a complementary pattern to obtain resources of animal, vegetable and also mineral origin. The development linked to the connection of ecological "floors" and the capacity to adapt that manifests in these groups through their technological industry constitute factors that allowed the subsistence of these populations during thousands of years^{28,38-40}.

From the camps at the mouth of the river, the opportunity to penetrate east through valleys and their watercourses allowed these Chichorro groups the realization of moving inland to supply themselves with wood, not available on the coast, and lithic material for their tools, which they obtained from basalt and quartz outcrops³⁴. It is possible to conclude that Chichorro groups settled on the coastline moved through coastal valleys, like Camarones, to approximately 50 km distance from the coast. In this valley in particular, inland sites associated to coastal occupations, like Conanoxa, were identified⁴¹.

One of the environmental factors that stands out in the settlement area of the Chichorro groups are the high concentrations of arsenic, especially in the Camarones River. Recent studies have revealed high indices of arsenic in Arica, Camarones and also Iquique, consistent with the elevated environmental arsenic found in superficial water (Arica 12-88 µg/L, Camarones 700-1300 µg/L and Iquique 70 µg/L)⁴².



• Sheet 21: Archaeological map showing the location of Component 02 and Conanoxa Site.



Origins of the Chinchorro Cultural Tradition

Research on the biological origins of the Chinchorro cultural tradition has considered two lines of proposals: one of foreign origin and the other of local origin.

The foreign origin proposals indicate that the root population of the Chinchorro groups would be from the Amazon region from where, product of the scarcity of protein resources and consequent demographic pressures, migratory waves would have been generated reaching as far as the coast of the southern Andes^{3,44}. This interpretation is based on bioanthropological indicators that confirm biological kinship through craneofacial measurements⁴⁵. There are also cultural indicators like the presence of elements from the hallucinogenic complex, as well as the remains of tropical bird feathers and evidence of yuca cultigens, all of which are registered later in the time sequence^{3,46}. The possibility that the Chinchorro groups could come from the Altiplano has also been suggested^{11,18,47}.

Conversely, a local cultural and population origin of the Chinchorro cultural tradition in the arid coast, and local records of funerary manifestations like artificial mummification have also been considered based on the research done in Pampa de Acha, located 6 km from the coast, at the confluence of the Azapa Valley with the Acha Valley (Arica).

These sites are specifically camp Acha-2 (8935 BP), along with the burial site named Acha-3 (ca. 8380-8120 BP)^{6,18,48,49}. Acha-2 constitutes a habitation site with evidence of lithic industry in the form of fishing and hunting tools, twined mats made from plant fibers and archaeofaunal remains that indicate a complementary mobility between the coast and valleys⁵⁰. The finding of a body wrapped in a decorated twined mat made of plant fibers, defined as the earliest registered individual in the Arica and Parinacota Region, stands out.

Furthermore,

"The funerary evidence analyzed in Acha-3 allows [us] to conclude that it is linked to the Acha-2 camp and that it would correspond to the beginning of the Chinchorro tradition in northern Chile (ca. 9000-8000 BP). This rooted human group that lived, died and was buried in Acha seems to be part of a colonizing population of the coast of the extreme north of Chile, of a not well-established origin, which arrived during the Early Holocene. It could be a precursor group that adapted and developed strategies for the specialized exploitation of marine and terrestrial resources and materialized the first ideas about mortuary rituals centered around groups of individuals, constituting multiple inhumations treated with high complexity. This internal and own praxis precedes, by a thousand years, the first evidence of artificial mummification" ^{51:106}.

The most recent analyses identify combined processes: the origin of the osseous remains of the sites in Acha, in Arica, would be explained by an early coastal migration; while for the remains of Camarones 14, in Camarones, migration would have come from the Altiplano^{8,52,53}. In sum, the population origin of the Chinchorro groups is still debated by archaeology and bioanthropology⁵⁴.

Social Context and Forms of Life in the Chinchorro Cultural Tradition

On the coast of the extreme north of the Atacama Desert, the environmental contexts that gave rise to this cultural adaptation that is unique in the world are still recognizable today. In Faldeo Norte del Morro de Arica and Desembocadura de Camarones, there are a series of archaeological sites that brings this millenary human testimony to the present: from 7000 BP, hundreds of generations of Chinchorro marine fisher-hunter-gatherers progressively developed their lives, their cultural tradition and perpetuated through mummification techniques the significance of death with great intensity in this territory.

Everything that is known about this human group has been possible through the evidence obtained in a century of scientific research, which is still taking place today. The number of archaeological and bioarchaeological findings have been preserved until today thanks to the environmental conditions of the region and also due to the particularities of the cultural material, especially in terms of funerary customs.

- **Being a Chinchorro fisher-hunter-gatherer**

In particular, when discussing the Chinchorro cultural tradition one refers to a "way of life that influenced economic, technological, mortuary and ideological features that evolved through time due to internal pressures and from the desert environment"^{34:201}. Following this definition, Chinchorro is understood as a dynamic social entity whose features must be observed in its development during the archaic history of this region. It is a way of life, with a millenary tradition, which emerged closely in conjunction with the local environment, that involved:

The intensive exploitation of marine resources through specialized technology that included a series of tools made of lithic and plant materials (fibers, wood, cactus spines), as well as instruments made of bone and shells. The exploitation of wetlands supported a broad use of plant fibers in textiles to make clothing, and to make tools and twined mats that were used in domestic as well as funerary rituals

The exploitation of lithic resources like basalt and chalcedony, absent on the coast, available inland and manifest today in task camps or “transient extractive camps”¹⁸.

A characteristic funerary pattern of multiple inhumations that included –although not in all cases– complex artificial mummification practices, was applied to individuals of different ages and sex, where the bodies were deposited in a supine position with scarce associated offerings³⁴.

- **Dwellings, camps and sedentism**

The camps located in a zone of sandy slopes on the seashore in Arica and in terraces and slopes at the mouth of the Camarones River constitute habitational spaces characterized by semicircular dwellings, distributed in a disperse pattern, with depressions prepared like floors by covering it with reeds and/or through compacting. These rooms are circumscribed by a perimeter of mounted posts made of wood or bones from marine mammals, put up to support a light shelter, presumably consisting of twined mats, canes or skins, for example Camarones-14, Camarones-8^{26,55-58} (Figure 26).



- *Figure 26: Types of Dwellings of Chinchorro Groups.*
SOURCE: ARRIAZA 2003 :68 FIG. 8C AND MUÑOZ AND LAGOS 2016 :72 FIG. 7B⁵

The activity areas, some of them communal, make up open spaces associated to hearths. Lithic reduction and food preparation, where discarding of refuse occurred inside and outside the dwellings, would have taken place there⁵⁶. Several task areas, especially shell reduction, have also been recognized and are visible on sites distributed along the coast⁵⁹ (Figure27).



• *Figure 27: Life in a Chinchorro camp.*
SOURCE: ARRIAZA AND STANDEN 2016 :343 FIG. 5³²

Twined mats made of plant fibers were one of the most utilized materials in inhumations as well as at the sites of domestic activity. Its spatial quality is particularly evident in funerary contexts, where it covers, for example, various bodies buried together or serves as their base (Figure 28).



• Figure 28: Twined mats made of plant fibers.
SOURCE: STANDEN AND ARRIAZA 2016 :168, 171 FIG. 6A, 6C⁶⁰

There is evidence of fire production in the camps and also in cemeteries, where combustion areas and, exceptionally, *yesqueros* (lighters) have been found in the archaeological record.

No domestic sites with evidence of public architecture, architectural enclosures for communal activities or areas built for ceremonial congregation, have been recognized thus far⁶¹.

Favorable weather and the plentiful coastal habitat have allowed to propose that the Chinchorro groups "had a sedentary maritime existence, exploiting marine resources all year round and not only seasonally"^{5:67}. Further evidence to support this proposition includes: (a) groups of simple dwellings built with skins, wooden posts and/or whale rib bones; (b) cemeteries used for long periods of time by several generations, typical of territorially

established groups; (c) archaeological sites with deep and extensive accumulations of shells and occupation remains of marine origin, and isotope analyses that prove the fundamental incidence of marine resources in their diet; (d) the existence of occupational diseases directly caused by sustained activities in relation to the sea (for example, external auditory exostoses)⁶²; (e) a record of subsistence diseases caused by the continuous occupation of places infested with pathogens, product of populous, quotidian and significantly densely populated living conditions⁶³; (f) gathering of materials needed for the mummification, time and energy invested in preparing the mummies. In sum, the high specialization of the coastal resources and the mummification practices are key features that argue for the existence of a sedentary life^{48,64}.

The Social Organization of Work

The camps of the Chinchorro tradition identified on the foothills of Morro de Arica and the mouth of the Camarones River found in their vicinity the necessary provisions of food and raw materials. A form of production based on fishing and the gathering of mollusks and to a lesser extent, hunting of marine fauna and gathering of wild plants was possible with an efficient technology, specialized early on and expedient. The spaces inhabited in the littoral and mouth of river ecozones constitute areas of high productivity that provide permanent and diverse resources during the entire annual cycle.

Based on the early evidence of Chinchorro occupation in the region (Camarones 14), concluded that society would have been initially egalitarian in terms of access to production, based on the distribution or exchange between members of the community and immediate obtention and consumption of food¹⁸. The former contrasts with the funerary evidence, in which social distinctions in terms of the variability of body treatments as well as in the material offerings were verified, differences that increase as time passes⁶⁵. The subject of social complexity and its development through the temporal sequence, in the context of Chinchorro marine fisher-hunter-gatherers is undoubtedly one of the problems worth researching in the future.

There have been notable advances in the study of social equality v/s differentiation according to sex and age. Thus, it has been argued that:

"the productive work is linked to the differentiation of sex and generation. Women and children were probably in charge of the exploitation of consumption goods of greater accessibility, like some types of mollusks and plant products, in the immediate area of the base residence. The adult males would be in charge of obtaining riskier resources, but of more prestige, dispersed in a greater area"^{18:173}.

This proposal has been supported by bioarchaeological analysis of paleopathologies and traumas^{66,67}. Between 5070-3670 BP, at the Morro-1 site, significant differences in subsistence activities done by men and women have been observed, in which "not everyone participated directly in the productive process"^{62:181}. The high frequency of osteomas of the external auditory canal verify the continuity of diving tasks (for example, sea urchins, *Loxechinus sp.*, can only be sourced through diving). This submarine task was carried out by the group's adult men (over 20 years of age). Moreover, arthritis of the vertebrae indicates the possibility that women were the ones to carry loads, be it equipment, food or infants⁶².

The difference in roles would not only have existed in terms of productive tasks., it has also been suggested that women and men would have participated in a differentiating manner in artificial mummification practices, in which,

"females were the morticians during the black period, and men took over during the red period. This speculation were based on the universality of female cooperation versus male competitiveness. The black represented a more communal effort; the mummies were more individualistic more generic. The communal cooperation may account for the long duration of the period. In contrast, the striking red style, of short duration, was more individualistic and probably prepared by male morticians attempting to gain prestige"^{68:192}.

From recent studies, it has been determined that artificial mummification tends to be performed on male infants^{17,69}. This must have been a significant ethereal and gender-based category, from the culture itself, at the moment of determining which procedures to perform on the body *postmortem*.

- **Infants: important people in the Chinchorro cultural tradition**

Infancy was a valued age for the Chinchorro communities, it was given visibility. This is reflected in the dedication and technical and esthetic work that was put into the complex preparation, artificial treatment and ornamentation of the infants after their deaths (Figure 29). It is well known that fetuses, neonates and infants were the main recipients of artificial *postmortem* treatments, that in their totality, except for a few exceptions, were treated as previously described^{17,65,69}.



- *Figure 29: Details of mask of Chinchorro fetus.*
SOURCE: MONTT 2016: 304 FIG 5⁷⁰

Infants “are essential to the biological continuity of all populations, but more so in small groups such as the *chinchorros*”^{71,32}. This continuity would have been the reason behind the decision to preserve themselves *post mortem* through a mummification process that has been interpreted as a ritual devoted to children^{56,72}. Infants, in general, have been regarded as having been loved, cared for, considered and as the center of the Chinchorro social structure, for whom specialized treatment was guaranteed once they were dead^{6,12,48,49,56,61,65,71,73-75}. Consequently, since 7000 BP and during almost 1500 years, infants were the only age category to be artificially mummified through the complex procedures of soft tissue and organ extraction and the reconstruction of the body’s structure and volume using wooden poles, cordage made from plant fibers and clay painted over with black manganese. Only from ca. 5400 BP did adult individuals also begin to receive a complex treatment through mummification^{48,71}.

The knowledge of the role that unborn infants could have had in the formation of social relationships of the Chinchorro groups and the way in which their presence was given meaning within the cultural matrix, in life, is a continuous challenge for archaeological and anthropological research. One of the arguments made to explain the differential selectivity of infants and children in relation to adults in their mortuary treatment has been the impact that the high mortality rate of newborns would have had on the social group. Based on the findings in Morro-1, Morro-1/6 and Camarones-14 sites, it has been verified that this rate reaches between 30% and 40%⁷⁶. This occurrence has been attributed to social practices like infanticide¹⁸, as well as the high probability that the deaths occurred due to the influence of environmental factors, like chronic arsenic poisoning, which is endemic in the area^{42,77-79}.

The ingestion of arsenic by expecting mothers is linked to spontaneous abortions, premature births, death during birth and neonatal death, among others, all of which have been interpreted as potential motives for the artificial mummification of fetuses, neonates and infants^{77,78,80}, a cause that for some researchers is of a psychological nature and is, therefore, difficult to prove⁸⁰.

Living with the Dead: Funerary Clusters and Installations of the Chinchorro Cultural Tradition

Perhaps the element that best expresses the complex symbolic life of the Chinchorro groups are the inhumations of their dead. To this day, their burials continue to be revealed on the coast of the Atacama Desert.

In the archaeological record, the Chinchorro cultural tradition is associated to a characteristic funerary pattern that is identified by the following features:

Multiple burials of bodies in a dorsal extended position, deposited directly over the sand at a shallow depth.

Variability of the Types of Post mortem Body Treatments

The use of plants, camelid skins and marine birds, with ocher pigmentation, to pose, cover and/or wrap the bodies.

Post mortem preparation of the body: evisceration, frame, filling, covering in clay and exterior paint.

Funerary offerings that gradually increase in number as time passes.

Within funerary areas, burials are found on hillsides and sand slopes on the southern margin of the area of the mouth of the Azapa and Camarones rivers and have been described as shallow, found between 0.30 and 1.50 m deep⁸¹⁻⁸³. Moreover, it is not possible to recognize mortuary structures or architecture in cemeteries or funerary installations^{48,49,75}, aside from the exceptional arrangement of marine mammal bones or lithic material circumscribing some inhumations. These exceptional findings were observed in certain sites, like Morro-1, Chinchorro-1, Camarones-14, Camarones-17 and Camarones-15C^{18,49,55,56,65,71,72,84,85}.

The difficulty in recognizing stratigraphic units that indicate temporality in the arrangement of individuals and offerings is added to the appreciation of cemeteries where

“stratigraphy is horizontal rather than vertical. Bodies were interred as a continuum, not as burial mounds. [...] This horizontal burial makes the classic stratigraphic superposition model inapplicable, and therefore context, seriation, and radiocarbon dating of the mummies are crucial for unveiling Chinchorro biocultural evolution”^{65 :663}.

In addition to the previous, *"a wide variety of styles and chronological types [of artificial mummification] within a single cemetery are found, indicating continuous use of cemeteries for thousands of years"*^{61:40}.

The power of these burial places would be conferred to them by the congregation of bodies and the resulting spatiality: the tradition of burying individuals over and over again in the same place over time, reaching millennia in some sites. This entire context remains fixed in specific points of the sacred and cultural landscape, with the case of Morro de Arica being paradigmatic, a geographical symbol that contains one of the most important funerary sites of the South American Archaic¹⁷.

Chinchorro communities, product of demographic and environmental factors, were progressively exposed to an increasingly intense relationship between life and death. Recent research has paid attention to the context in which the peak in artificial mummification took place²⁵. The demographic increase, added to the extreme dryness that characterizes the Atacama Desert would have generated a favorable environment for a growing interaction between the living and the dead, because environmental conditions limit putrefaction of the bodies producing natural mummification. Mummified bodies increased over time, sharing activity spaces with the living. The closeness generated between both the living and the dead became a significant component in the life within society and the landscape. This would have determined the emergence of ideological innovations manifested in the artificial treatment of the bodies.

Toward the end of the temporal sequence, it has been argued that artificial mummification turns into an ideological response to processes of adaptation to the territory. When the environment that served as basis for the adaptation of Chinchorro groups became less favorable in terms of available resources, there were repercussions in different areas of their life in society:

"What we see is that the apparent stressful and conflicting social atmosphere and the transformation of natural conditions during the later phase of the Chinchorro were associated with a diversification and an increase in AM [Artificial Mummification] procedure [...] which means that besides the technological changes to intensify production people made effort to build on the ideological side and rituals of their social structure"^{16:647}.

It is often thought that a complex social phenomenon like artificial mummification cannot emerge in societies with a "simple" sociopolitical and economic organization like the Chinchorro⁵. The capacity to maintain the practice of artificial mummification of the dead over extended periods of time would indicate *"deep social integration or a sense of community"*^{5:214} among these marine fisher-hunter-gatherers. Artificial mummification would have played a key role for the Chinchorro groups as a form of expression that allowed perpetuating values and meanings shared through the bodies of their deceased members, becoming in time the most distinctive feature of this cultural tradition.

The mummies could even represent *"the earliest form of religious art found in the Americas"*^{68:2}; that is to say, an art that would have put its creators in contact with the sacred dimension of life in society. Through the sacred, materialized in the bodies treated artificially and in the funerary spaces, the identity and cohesion of these groups would have become rooted in these territories during extensive periods of time. This sense of permanence is particularly visible in cemeteries that span extensive periods of continual use⁸.

A true sacred or spiritual landscape (*"spiritscape"*)¹⁶ is configured through the placement of artificially produced bodies in the territory and their arrangement in cemeteries near the camps, like it occurs at Desembocadura de Camarones, or in more exclusive spaces like the sites of Faldeo Norte del Morro de Arica.

The funerary deposits are found in general in a spatiality conceived exclusively for that end, a situation that would have territorial implications⁵. Chinchorro mortuary installations can be defined as spaces to deposit one or many deceased and their offerings, grave goods and/or wrappings. Of a total of 186 recorded installations, the Arica and Parinacota region concentrates 87%, with 115 registered in Arica (62%) and 46 in Camarones (25%)¹⁷.

The density of individuals in each cemetery or cluster is variable and especially high in the mouth of the Azapa River, Morro de Arica and to a lesser degree, on the slopes located at the mouth of the Camarones River. From this point southward, concentrations are quantitatively less significant (e.g. Patillos, Iquique).

Within the clusters or installations, the fact that the mummies were deposited in various directions, or one on top of the other in apparent disorder drew the researchers' attention⁸⁶. This suggests to some that burial places were revisited and intervened over and over again⁸⁷, with subsequent alterations to the inhumations that preceded, making it quite common for archaeologists to find incomplete bodies^{1,6,81,82,88,89}. The existence of incomplete bodies in mortuary contexts, in this case, would be the effect of this manipulation and not the intention of relatives to bury parts of the individuals.

It has not been ruled out that the bodies were removed or maybe reactivated, returned to the “living” social context, which could derive in observations like those noted by Bird^{49,89} of bodies that were repainted and maintained⁹⁰ (Figure 30).



• Figure 30: Mummy being repainted.
SOURCE: ARRIAZA AND STANDEN 2016 :348 FIG. 8³²

These clusters are characterized by presenting a:

“group of bodies that were inhumed in some specific cases, simultaneously, or if not, through very little time between the different moments to deposit one body or another, until a funerary unit is formed”^{93:145}.

The collective and diverse inhumations in terms of sex, age and types of mummification³⁸ possess a chronological correlation that determines that Chinchorro cemeteries cannot be classified within a given evolutionary period, or cultural phase, since only some mummies in a Chinchorro cemetery in particular would correspond to a certain cultural phase^{48,81,89,91}.

A very rooted idea in the history of Chinchorro research is that groups of individuals were buried next to one another given their family ties, as members of the same clan⁹², with an idea of kinship that has been discussed within the same discipline^{2,55,72,75,84,89,93,94}. This idea is reinforced by the observation made in mortuary contexts of a tendency to place the bodies of children, as well as neonates and fetuses on the breasts of adult women⁶⁹. Analyses of mtDNA have been performed which have not produced results because DNA in general is very degraded (Bernardo Arriaza, personal communication, 2013).

Chinchorro Mortuary Art and the Oldest Mummification Evidence in the World

In contrast to other marine fisher-hunter-gatherers in the world, the Chinchorro developed a millenary mortuary tradition characterized by the artificial and complex mummification of the dead, especially infants.

Some of the most significant evidence protected *in situ* in the Property, at the components Faldeo Norte del Morro de Arica and Desembocadura de Camarones corresponds to stratigraphic deposits with artificially prepared bodies through diverse procedures.

Origins and Causes of Chinchorro Artificial Mummification

The complex preparation of the bodies began 7000 years ago with the *post mortem* intervention of neonates, infants and children at the mouth of the Camarones River, in the Camarones 14 site. These bodies, as well as in those of Camarones 17, mark the beginning of a millenary funerary tradition, in which knowledge of anatomy mixes with the manipulation of materials provided by the environment, technical expertise and an exquisite aesthetic sensibility (Figure 31).



• Figure 31: Recreation, preparation of pigments to paint mummies.
SOURCE: ARRIAZA AND STANDEN 2016 :267 FIG. 6b

Archaeological research¹⁸ has considered that the genesis of the artificial mummification observed in Camarones could have a foreign origin and would be product of cultural diffusion from tropical lowlands of the eastern slopes of the Peruvian Andes. Likewise, given the complexity of the mummification and other elements like intentional cranial deformation^{95,96}, it has been proposed that Chinchorro artificial mummification is not a local phenomenon but that it would have originated in southern Perú.

Contrary to these proposals is the hypothesis of artificial mummification as a local phenomenon, which has been well substantiated:

"The coastal region of Arica-Camarones, therefore, can be considered as the cultural epicenter of the Chinchorro. From this region, mummification spread probably north and south, because the radiocarbon dates for the mummies turn out to be later as one moves away from this center, especially from Camarones"^{75,116}.

In summary, current data on the origin of Chinchorro artificial mummification would indicate that the mouth of the Camarones River is the most probable environment where the artificial mummification of these bodies was created around 7000 BP. However, it is in Arica, specifically at Faldeo Norte del Morro de Arica, where these practices of artificial mummification would reach a significant height in terms of aesthetic, plastic, technical, material and social variability and complexity.

During the millennia that the complex preparation of the bodies endures, methods maintain the extraction of soft tissue, keeping the structure given by bones like the skull, vertebrae, ribs and/or extremities and the reconstruction of the body's volume using clay, sediments, skins and other materials. The finishing stage includes covering the body with hides, in cases where the skin was not preserved, the modeling of facial features and the superficial painting of the entire body using colored black and/or red clay⁶⁵.

The question regarding the social factors that determined how and why artificial mummification begins has had, throughout the research, multiple answers^{1,12,17,49,75,92,97}. It has been associated to practices of anthropophagy, based on the significant number of cases where the body was completely eviscerated. Infanticide has also been proposed as the cause⁸⁸. Both situations, although possible, are difficult to investigate through bioanthropology and archaeology and have been not considered much in academic discussion.

Another possible cause in the social decision to artificially mummify the bodies is the high infant mortality rate that occurred at the heart of the Chinchorro populations, consequence of arsenic poisoning due to contaminated drinking water (*hydroarsenism*)^{42,77,79,80}. Thus, the complex treatment performed on the bodies of infants would have acted like a social mechanism to mitigate the grief and uncertainty generated by the constant deaths. Through artificial mummification, the Chinchorro groups would have projected the existence of people by reinventing their physical appearance (Figure 32a, 32b and 32c).





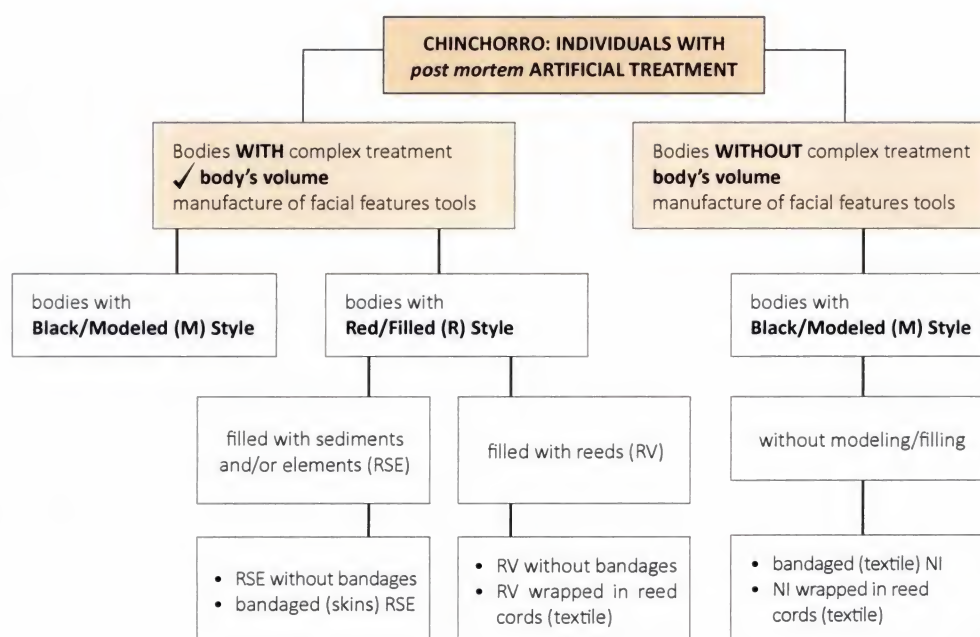
• Figure 32a, 32b, 32c: Recreation of a family suffering the loss of a child; recreation of the preparation of a newborn's body; recreation of a family group wrapping a mummified body.
 SOURCE: ARRIAZA AND STANDEN 2016 :220-221; 222-223; 224-225 FIG. 4; FIG. 5; FIG. 6

Styles of Artificial Mummification

In the stratigraphic deposits that make up the archaeological sites of the Property and its components, there are still bodies with complex *post mortem* treatments.

Early in the history of scientific research, the variability in the procedures applied to the bodies was recognized, always aware of the fact that the association between bodies left in their natural condition and bodies mummified artificially was a constant in time.

Regarding the variability of the funerary patterns, Uhle³⁵ developed the first funerary typology of this cultural tradition. He classified mummies into three types: 1 simple mummies; 2 mummies of elaborate preparation or bodies preserved by removing organs and the subsequent remodel of the body; 3 mummies covered completely by a layer or patina of mud. This typology has not varied substantially (Figure 33).



• Figure 33: Synthesis of the styles of Chinchorro post mortem artificial treatments proposed by Arriaza (1994) and Montt (2014).

SOURCE: ADAPTED FROM ARRIAZA 1994 AND MONTT 2014^{17,92}

Based on the evidence of Morro 1, Allison and his collaborators^{75,97} differentiated greater variations in funerary procedures and characterized a series of subtypes that were basically derived from Uhle's typology⁹³. Later on, Arriaza⁹⁷ systematized the types of complex *post mortem* preparations again, based on the exterior color of the body and its interior treatment, establishing a classification comprised of the following styles: black mummies, red mummies, mummies with bandages, mummies with mud coating and natural mummies. This researcher refines the temporal organization of evidence through an important battery of absolute dates. Guillén⁹⁹ and Llagostera⁶ add a new style of treatment denominated mummies wrapped in reed cords, that they indicate could be considered a variant of the bodies with bandages. Finally, Montt¹⁰⁰ systematizes the artificial treatment of 183 bodies with Chinchorro artificial treatment according to its plastic elaboration, specifically the procedures and materials that allow achieving the body's volume (thoracic, abdominal and pelvic cavity) and the formal characteristics of the elaboration of their faces or masks.

Black or Modeled Mummies

About 6000 years ago, 1000 years after the early evidence of artificial mummification in Camarones 14 and Camarones 17, new expressions of artificial mummification emerge in funerary sites located on the coastal terraces of Arica, a few kilometers from the coast. These sites are Maderas Enco 1, Maestranza 1 and Chinchorro 1, where towards 6070 BP, the first evidence of a new style of complex *post mortem* preparation, known as the Black or Modeled Mummy Style¹⁷, is recorded. This style is defined by a highly intervened torso in terms of the extraction of its soft contents, conserving the original skeletal material (for example, vertebrae and/or ribs), over which elements of plant origin, like sticks and fibers, often tied together with rope made from the same material, are placed along a longitudinal axis. Like its name indicates, the bodies and torsos of these individuals were subsequently modeled using a gray paste (clay) and then painted with black manganese oxide^{72,84,88} (Figures 34 and 35).

Morro de Arica, and particularly its northern slope, becomes towards 5000 BP a geomorphological formation symbolically valued by the Chinchorro communities for the burial of their dead, in particular bodies of the Black or Modeled Style. This space constitutes a Chinchorro cemetery par excellence, one of the largest in terms of the number of buried individuals and of longest temporal continuity in the Atacama Desert. Thanks to continuous archaeological rescue done in the area, the persistence of the intervened bodies in the Black Style until 4750 BP has been recognized and the emergence of a subsequent type of *post mortem* treatment, called Red or Filled Mummies, has been recorded^{101,102}.



• Figure 34: Detail of inferior extremity of an adult showing bones, wooden posts, cordage made of plant fibers, clay and skin painted with manganese.

SOURCE: ARRIAZA AND STANDEN 2016 :261 FIG. 2 AND ALSO ARRIAZA 1994 : 15 FIG. 2 ^{103, 92}



• *Figure 35: Black mummy, adult individual*
SOURCE: ARRIAZA AND STANDEN 2016 :258 FIG. 1A¹⁰³

Red or Filled Mummies

Red or Filled Mummies meant material, aesthetic and social innovations. The torso is intervened with variations in terms of the manipulation of the skeletal material as well as the preparation –or not– of a structural axis. Soft tissue and thoracic, abdominal and pelvic contents were generally extracted, totally or partially, through incisions made on the original skin which is preserved (Figure 36). This creates a space that is filled by (a) sediments and/or (b) elements of organic origin (Mummies Filled with Sediment and/or Elements) and (c) bundles of reed fibers, arranged longitudinally (Mummies Filled with reeds Plants). In this case, the body's own skin, which has been conserved, was painted with a red, iron oxide compound. In contrast to the black mummies, red mummies were prepared with a wig, which in some cases was quite long, attached to the head through a layer of clay. The deceased's facial features were modeled and carved using more expressive forms and volumes⁶⁵ (Figure 37).

This type of complex preparation is typical of the sites located at Morro de Arica and are not observed in archaeological cemeteries in Camarones, where naturally mummified bodies are predominant. This natural mummification does not include a complex preparation (i.e. without the evisceration of the body), however, the faces received artificial treatments in the form of masks, which display greater technical and formal simplicity than those that came before them. This simplicity contrasts with the important number of artifacts, specially textiles that, in some cases, accompany the dead⁶⁵.



• *Figure 36: Detail of abdominal incision.*
SOURCE: ARRIAZA AND STANDEN 2016 :264 FIG. 5 ¹⁰³



• *Figure 37: Detail of facial features of red/filled mummy.*
SOURCE: ARRIAZA AND STANDEN 2016 :265 FIG. 6A

Intervened Natural Mummies

As the name indicates, this style includes bodies with naturally mummified torsos by environmental agents and with anthropic intervention in the form of two types of treatments: (a) the superficial application of a substance similar to mud, registered at the Morro 1 site or (b) the addition of bandaging or wrapping in reed cords, strips of animal skin, plant fibers, spun yarn or textiles of the torso and extremities, with the face covered in clay (Figure 38). This last type of intervention is observed at Morro 1/5, Camarones 15D and Camarones 15E sites, and also further south, in Patillos 2 (Iquique) site¹⁷.

Artifacts, Use, Activities

Through archaeological labor, Chinchorro sites, either domestic or mortuary, have provided significant material culture and information on their associations, functionality and context. The presence of *in situ* artifactual evidence found in domestic sites that are part of this nomination, like Conchal Sur, Camarones 14, Camarones 17, Camarones 1, Camarones 2 and Camarones 8, ensure possible future studies on the relationships these populations had with each other and their environment, in addition to discovering their way of life, technology, subsistence and settlement^{17,92,100}.

See Annex 2: Cultura Chinchorro, Catálogo de Artefactos / Chinchorro Culture, Artifact Catalog (B. Arriaza y V. Standen, 2016)



• Figure 38: Mummy wrapped in reed cords with strips of skin.
SOURCE: ARRIAZA AND STANDEN 2016 :268 FIG. 7A¹⁰³

2.a.v. The Property's Components: Faldeo Norte del Morro de Arica and Desembocadura de Camarones

On the coast of the most arid desert in the world, the Atacama Desert, settlements of the Chinchorro cultural tradition are found, located in a privileged environmental context, composed of material and human remains that testify to humanity's oldest artificial mummification practices, developed by marine fisher-hunter-gatherer communities who captured, through this practice, their beliefs of transcendence in the face of death.

Based on scientific research done on the archaeological sites and their cultural material, we know that the settlement of Chinchorro communities at Faldeo Norte del Morro de Arica and at the mouth of the Camarones River occurred between 7420-2840 BP¹¹¹. The components of the present nomination are relevant because they contribute unique data for the archaeological reconstruction and knowledge of the historical and social development of the Chinchorro cultural tradition.

Among the group of archaeological sites attributed to Chinchorro fisher-hunter-gatherers, cemeteries, ritual spaces exclusively destined to deposit dead people, predominate. These places have bodies treated artificially, naturally preserved bodies and a group of diverse artifacts arranged around the body as grave goods, offerings or wrapping. The totality of archaeological sites of Faldeo Norte del Morro de Arica (Component 01) and the majority of sites documented at Desembocadura de Camarones (Component 02) are cemeteries^{6,18,49,65,71,72,74,82,84,93,95,105,112-115}. There is also record of domestic sites, among which there are refuse piles, shell middens and living areas, all of them found at Desembocadura de Camarones, depicting quotidian activities carried out by Chinchorro communities^{55,72,83,116}.

The description and characteristics of the Property have been developed based on scientific research led by diverse researchers for a century^{18,72}. This research and the *in situ* records of archaeological sites document in the Property the existence of original contexts that are a testimony to the Chinchorro cultural tradition, now gone. The material evidence that makes up the settlement of the Chinchorro cultural tradition can contribute to a significant advance in the knowledge of Chinchorro society in the future. This *in situ* information is a crucial part in the current recognition of the cultural and testimonial value of its archaeological heritage, raising awareness among local communities on the importance of their appreciation and protection of these remains. The value of the archaeological deposits in both components is high and relies on its exceptional conservation. This allows us nowadays to envision transformation through time both on a geological and human scale.

Component 01: Faldeo Norte del Morro de Arica

Morro de Arica is one of the most impressive geographical features on the coast of the south-central Andes^{2,58,117}. Formed by the hill called El Morro (125 m a.s.l., 18°28' S Lat.; 70°18' W Long.), it is a geomorphological landmark that stands out visibly in the coastal desert landscape, like a promontory. This rocky scarp is the last remnant of the Coastal Cordillera, that in this zone falls abruptly into the Pacific Ocean leaving, toward the south, a narrow littoral margin. This promontory flanks the south of the broad valley terrace formed by the mouths of the Lluta and Azapa rivers, area occupied today by the city of Arica. Morro de Arica as a "geo symbol" constitutes a spatial witness, most probably instrumental in the Chinchorro's territoriality, but above all a physical witness, symbol of time, lineage and memory^{16,17,49,118}, surely valued by Chinchorro groups in their settlement. The Faldeo Norte del Morro de Arica component corresponds to a geographical denomination of the northeastern slope of Morro de Arica, which currently corresponds to the southern limit of the urban grid of Arica's old city center. It is a steep talus made up of a rocky terrain covered in dunes, now surrounded by houses. In addition, the area has the city's only pedestrian access to the top of El Morro, where there is a lookout point, a religious monument and a small space that houses Chinchorro archaeological material (currently closed to the public).

On Faldeo Norte del Morro de Arica, there are records of continuous occupation by different cultural groups of the region spanning the Archaic, Formative and Late Intermediate periods during pre-Columbian times, as well as remains associated with the history of Arica from the Colonial period to the present. The Chinchorro presence occurs during the Middle Archaic, Late Archaic and Early Formative with initial dates from ca. 5400 BP⁶. It is important to note that archaeological sites assigned to the Chinchorro cultural tradition at Faldeo Norte del Morro de Arica are not reused in subsequent epochs, they are in general single component sites.

Almost in its entirety, the settlement encompasses a *continuum* of deposits of bodies and artifacts, constituting the largest funerary site identified for the Archaic Period in the Atacama Desert. Archaeological evidence registered in this space shows the exceptional technical complexity and diversity developed for the *post*

mortem artificial treatment of human bodies and is representative of nearly 1800 years of the development of the Chinchorro funerary art⁶⁵.

In general, archaeological sites assigned to the Chinchorro culture correspond to funerary deposits comprised of bodies with artificial and natural mummification. The totality of archaeological sites included here at the Faldeo Norte del Morro de Arica Component and most of the sites from the Desembocadura de Camarones Component belong to this type of sites. It is worth mentioning that Faldeo Norte del Morro de Arica constitutes a *continuum* of deposits of bodies, being the largest cemetery in terms of individuals identified in the Archaic Period in the Atacama Desert. Then, a second type of site corresponds to domestic archaeological sites, among which are garbage dumps, shell middens, activity areas and sectors defined as housing areas, that in some cases are associated with burials of mummified and not mummified bodies, found in certain layers of occupation or at the base of these. All of the domestic sites that are a part of this nomination are found in the Desembocadura de Camarones Component.

There is scarce evidence, until now, of domestic occupations identified in Faldeo Norte del Morro de Arica, however, zones with hearths and refuse of domestic activities have been detected in other urban areas of Arica, like the Yungay 372 site (Hotel Savona) and an exposed profile in Colón 1²⁸.

The archaeological sites in Faldeo Norte del Morro de Arica have been named by the archaeologists responsible for the excavation of these findings along the way or according to their location. In particular, Morro 1, Morro 1/6, Morro 1/5 sites and the area corresponding to Uhle's "Aborígenes de Arica"^{83,92,93,116} are comprised of the same population substrate⁷⁵ and are part of the same site, made up of various inhumation events.

Past research has, therefore, put emphasis on the study of mortuary patterns and the bioarchaeological characteristics of these early populations.

Archaeological sites

- **Morro 1 Site**

The Morro-1 archaeological site is an extensive funerary area excavated on diverse occasions throughout the 20th century⁷⁵. Its location in the middle of the urban area of the city has made this zone especially susceptible to interventions caused by urban growth and the installation of infrastructure like, for example, the supply of drinking water for the city of Arica. Archaeological interventions in this area have responded to the need to rescue bodies that were exposed by said installations. To date, 200 individuals from this site have been registered, many of them with a complex artificial treatment that was applied without distinction to infants and adults, both male and female. The number, diversity and complexity of this archaeological evidence, in addition to its important research have turned Morro-1 into an emblematic archaeological site of the Chinchorro cultural tradition (Figure 39).



- **Figure 39: Register plan. Morro 1 cemetery.**

SOURCE: MARVIN ALLISON PHOTOGRAPHIC FUND DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

Like the majority of the sites located at Faldeo Norte del Morro de Arica, the stratigraphy of the Morro-1 cemetery is made up of layers of very loose sand, which maintains little stability to visualize strata, therefore, only one stratigraphy at grade level or funerary group level is known. During the rescue excavation done in 1984, a total of 134 bodies are recovered, 80 of which have complex preparation in their thoracic, abdominal and/or pelvic cavity. Within this context, four clusters of multiple exhumations stand out for their composition that includes, without exception, infants and adults of both sexes treated artificially. All four of them represent the early phase of occupation of the site^{1,49,75,93,97,119,120}.

- **Group Nº 1.** Made up of 7 individuals, buried simultaneously, with adults arranged parallel to one another and over them, some infants, all of them displaying the same type of artificial mummification (Black/Modeled Mummies).
- **Group Nº 2.** Made up of 6 individuals that, is inferred, also must have been buried simultaneously. All 6 individuals are found on the same level, parallel to one another, only one boy was situated immediately over an adult. All corpses are treated in the same manner, filled through incisions on the skin and painted red with iron oxide (Red/Filled Mummies with Sediment and/or Elements).
- **Group Nº 3.** This group is made up of 5 bodies, apparently also buried simultaneously, arranged parallel and close to one another. The artificial treatment practiced on these bodies is similar to the previous group, except for the unique case of an infant that has variations in the arrangement of his skin, which was wrapped around him like a bandage (Red/Filled Mummies with Sediment and/or Elements).
- **Group Nº 4.** In contrast to other groups, it does not seem to correspond to the same inhumation event because the bodies are arranged in two levels separated by a sterile layer 15 cm thick. This type of artificial treatment is not homogeneous. Most bodies are treated by filling their cavities (Red/Filled Mummies with Sediment and/or Elements), with one case where the body is covered by a superficial layer of sand. This last form of treatment is exclusive to the Morro-1 site and not present in any other sites.
- **Double inhumation:** It comprises two infants with complex treatment.

In addition to the previously mentioned groups, there are several individual burials, mostly bodies without artificial preparation. These bodies which were mummified by natural agents, without human intervention total 79 individuals that along with the 18 individuals only covered by a layer a sand constitute the late phase of occupation of the area.

The bodies deposited in the Morro-1 site are associated to a significant number of artifacts, arranged as grave goods (on the body) or as offering (next to the body). These artifacts are laid out in this ritual context, to a lesser extent, in individuals with complex treatment and in a greater number of bodies that were naturally mummified. Among the grave goods found were clothing items like *faldellines* (fringed skirts) made from plant and camelid fibers, loincloths, woven belts, headbands and headdresses, skin blankets and lastly, necklaces and beads. The materials that make up the offerings are, in general, related to subsistence activities in the Chinchorro community like marine and terrestrial hunting, fishing, the processing of food and other materials, and the consumption of psychoactive substances^{49,83}.

It is currently possible to observe on the surface of the site that it has great potential to provide information from a heritage and scientific standpoint.

- **Morro 1/5 Site**

The Morro 1/5 archaeological site is a massive tomb made up of 16 bodies treated artificially (Red/Filled Mummies with Sediments and/or Elements), plus one in its natural state of preservation^{49,65,93}. This group of individuals, deposited within a short time span and without a particular order or orientation was located near water tanks (Morro-1 site) and the statue of the Virgin, Mirador La Virgen site (Figure 40). As in other sites of this zone, burials were found to be relatively superficial, between 30-80 cm deep, this time over a sandy, humid stratum at the moment of excavation product of the domestic activities from neighboring homes and the storage of water in nearby water tanks (Figure 41).

The majority of the individuals that make up the Morro 1/5 group are children treated in a complex manner, fluctuating between 10 and 12 years of age and full-term fetuses. Of the 3 adults in the site, 2 were women and were artificially prepared. The only registered male adult was not artificially treated.

In some bodies in Morro 1/5, different forms of artificial treatment are observed in comparison to the other recorded sites at Faldeo Norte del Morro de Arica, with innovations that include the evisceration of body cavities by making incisions in the posterior part of the body, maintaining the original skin, an incomplete process of flesh removal and the internal preparation of the cavities by introducing hot coals, which were later stuffed. The finishes on the body show some differences where a thick layer of red-ocher paste was applied. These procedures could correspond to a simplification of those recorded in other sites (for example, Morro-1), as later manifestations of the practice of artificial mummification.



- Figure 40: Area of the Virgin Mary's Shrine where the Morro 1/5 site would be located.
SOURCE: SITE CHINCHORRO, MANAGEMENT AND PROTECTION PLAN. UTA

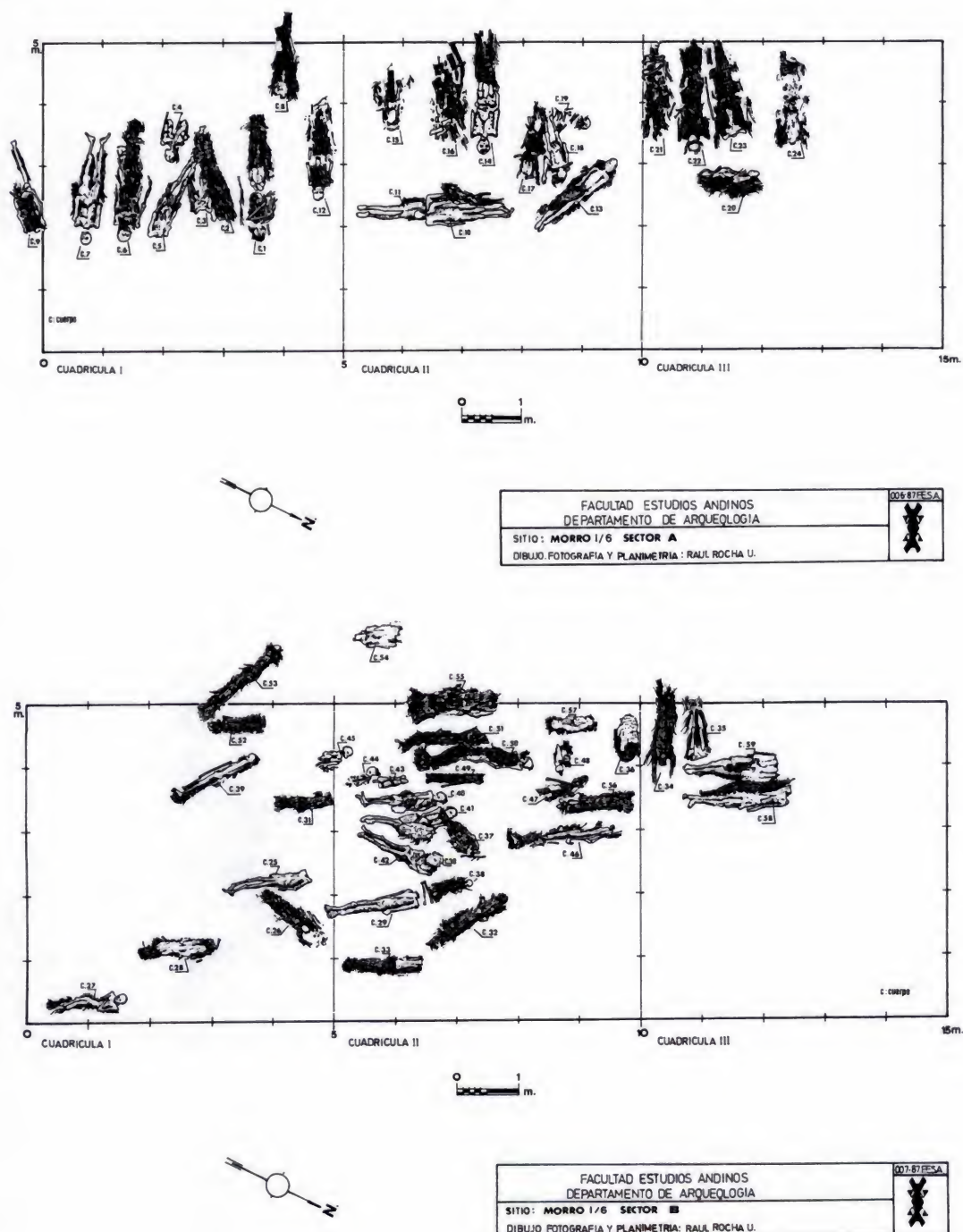


- Figure 41: Water Tank Area, Faldeo Norte del Morro de Arica Component.
SOURCE: SITE CHINCHORRO, MANAGEMENT AND PROTECTION PLAN. UTA

- **Morro 1/6 Site**

The Morro 1/6 archaeological site is the sixth funerary area excavated in the area of Faldeo Norte del Morro de Arica, specifically where a plot was being leveled to build a sports field in a narrow flat strip of land that extends behind the houses on the street called Heroes del Morro, between Colón and San Martín street^{6,116}.

These findings are found under a first and thin layer of loose sand, followed by another of variable thickness, hardened by environmental humidity and soil salinity, reaching a stratum of loose, greyish sand that contains numerous funerary bundles covered in layers of plants from the wetland environment. Due to post-depositional processes, like the differential accumulation of sand due to aeolian action, these human bodies lie at diverse depths, from 30 to 100 cm. (Figure 42).



• Figure 42: Plan of the distribution of bodies in the Morro 1/6 site.
SOURCE: FOCACCI AND CHACÓN 1989 :18,19.¹⁰⁵

All the bodies without complex preparation are distributed in two sectors. However, just as in other Chinchorro contexts, individuals of both sexes are displayed in an extended position and buried collectively. They have applications of red, green, ocher and blue paint on the head, face and hands. They are mostly adults and are found wrapped in twined mats made of plant fibers, pelican skins and wool textiles. In 17 cases, there are records of the extraction of the head, practice that would have occurred after the primary burial, being occasionally repositioned within the same grave.

The people buried in Morro 1/6 have grave goods like *faldellines* made from plant and camelid fiber, loincloths and woven belts, wool blankets and lastly, necklaces and beads. The materials given as offerings are related to subsistence activities like marine and terrestrial hunting, fishing, marine gathering, the processing of food and other materials, and the consumption of psychoactive substances. In addition to the former, there are previously not recorded artifacts in the context of Faldeo Norte del Morro de Arica, for example pyro-engraved pumpkins and malachite beads.

Although the Morro 1/6 site has been defined as post Chinchorro¹⁰⁵, today it can be suggested that these contexts testify to the last stages of the Chinchorro marine fisher-hunter-gatherer way of life at Faldeo Norte del Morro de Arica. Presently, it is possible to observe scarce material on the surface of the site¹⁰⁵.

- **Colón 10 Site Museum**

The Colón 10 Site Museum that belongs to the Universidad de Tarapacá is located in the urban area of Arica's old city center, in the area of Faldeo Norte del Morro de Arica.

As a site museum it is set up for the exhibition of Chinchorro bodies in situ from later periods to up to 6000 years old in the original space they were found.

This site was discovered in 2004 during an excavation to salvage the interior of a house located in number 10 Colón Street, in a property where there were plans to build a hotel. After confirming that a cemetery covered a greater part of the property and that the conditions of fragility and vulnerability of the osseous remains made their removal and transfer to the San Miguel de Azapa Museum impossible, it was decided to keep the bodies in situ and design a site museum around them, managed by the Universidad de Tarapacá, a unique initiative in terms of heritage management in Chile.

This exhibition space, therefore, was conceived to protect, conserve and display the archaeological heritage of the Chinchorro culture, conserving the house and its archaeological vestiges. Colón 10 currently constitutes the space par excellence to link today's communities to the Chinchorro cultural heritage. This site museum has been open to the public since 2010, it has maintained the bodies where they were found and put them on display for the public, a pioneering experience on a global scale for a hunter-fisher-gatherer funerary site. It was verified that the cemetery extended past the limits of the house (Figure 43). Currently, Colón 10 spans an excavated area of 110 m², where 49 bodies are deposited with artificial as well as natural mummification (Figure 44).



- **Figure 43:** Multiple inhumation in Colón 10. The photograph illustrates the complex situation of the bodies as the adobe retaining wall burst, intruding into the contiguous house.
SOURCE: VIVIEN STANDEN



• *Figure 44a and 44b: Bioanthropological findings of the Colón 10 Site.*
SOURCE: VIVIEN STANDEN

According to Standen and collaborators²⁸ the characteristics of the excavated area currently on public display are summarized as follows:

- **Sector 1.** It consists of a first level where 22 bodies were recovered: 10 adults, 10 infants and 2 adolescents. Multiple burials, with bodies lined one next to the other in an extended supine position oriented south. Infant bodies received a more complex treatment, displaying features of artificial mummification: mud masks, reinforcement of the skeleton, filling of body cavities and the use of wigs. Some superimposition is observed between bodies, which denotes the different moments in which they were deposited.
- **Sector 2.** There is record of 10 bodies: 8 adult and 2 infants. The placement of the bodies is not uniform like in the previous sector: the bodies do not maintain a regular proximity, nor the contact between each body. Here, infants also received artificial treatment, this time superficial, because one possesses a mud mask and the other painted hair, both in red. Four adults display mummification through mud coating and five are in their natural condition, wrapped in twined mats made from plant fibers.
- **Sector 3.** There are 17 bodies: 12 adults, 2 infants and 3 individuals that, due to preventive conservation, are still partially covered with sediment. These bodies are arranged in different directions, some extended and others in a flexed position. Five adults display a mud coating treatment. The funerary pattern in this sector shows differences with Sector 1 and similarities with Sector 2. However, the elements of the funerary bundle are common in all three sectors, where the twined mats and skins from marine birds that were painted red stand out. Just like in Sector 1, at least 3 levels of bodies have been observed.

An aspect that stands out in this site are the scarce funerary offerings that these bodies received, which contrasts with other sites of the late phase of the Chinchorro cultural tradition, where it is common to find a greater number of offerings.

During the excavation, it was possible to observe that under the exposed level in sectors 1 and 3, there are other cultural levels that contain inhumations, to which there was no access due to the conservation measures on site. Although there is still no scientific dating of the bodies recorded on the upper level, it is estimated to be 3700-4000 BP. The remains deposited in the lower levels, which have not been excavated yet and include bodies with artificial mummification, could be even older, as old as 5500 BP (Figure 45).



• Figure 45: General view of Chinchorro human bodies in the Colón-10 site.
SOURCE: ROMERO 2016 :403 FIG. 8 ¹²¹

• Mirador La Virgen Site

This site was excavated due to the remodeling of Mirador La Virgen (lookout point), located on the western area of the northern slope of Morro de Arica, where Colón Street comes to an end¹²².

It encompasses a funerary area comprised of 14 individuals of which 2 infants display complex treatment (Red Mummies). Another two bodies show certain signs of artificial mummification and the remainder do not display evidence of artificial conservation as they are skeletonized.

The bodies concentrated in the western area of Platform 1 (12 bodies) and the two remaining bodies were placed in the eastern area of Platform 2 (highly disturbed and stirred bodies). These bodies were wrapped in twined mats, bird skins with ocher pigments and/or camelid skins. Some have vestiges of headbands on the cranium, made of spun camelid fibers. As is usual, clothes are characterized by the typical white cordage made of camelid and/or plant fibers that are part of a *faldellín* and loincloth. The offerings consisted of a net-type bag made of plant fibers (*chinguillo*, *chinchorro*); small brushes made of plant fibers; knife with handle with lithic blade, among others.

These bodies form a multiple burial, made up of at least four individuals which were arranged one immediately next to the other in the same position, depth and orientation. These individuals were placed over a common twined mat and covered also with another common twined mat, suggesting that they are secondary burials

and that they were deposited at the same moment in this place. A double burial was also found, and the rest were individual inhumations.

Of the 14 burials, six were rescued to avoid their destruction and were moved and deposited in the San Miguel de Azapa Museum, belonging to Universidad de Tarapacá, in Arica. The remaining eight burials stayed *in situ*, protected, but in unstable conditions due to the characteristics of the ground.

ID N°	NAME OF SITE	REGION	COORDINATES OF CENTRAL POINT	ATTRIBUTE
Component 01. Faldeo Norte del Morro de Arica	Morro-1	XV Region Municipality of Arica	Zone UTM E 360475	Mortuary space with the largest number of individuals and greatest diversity of post mortem treatments registered for the Chinchorro cultural tradition.
			Zone UTM N 7956034	
	Morro-1/5	XV Region Municipality of Arica	Zone UTM E 360381	Mortuary space that bears witness to inhumation events and practices of artificial mummification of bodies, mostly on infants, which occurred during limited time interval.
			Zone UTM N 7956163	
	Morro-1/6	XV Region Municipality of Arica	Zone UTM E 360475	The mortuary space bears testimony to the last phases of the Chinchorro funerary tradition, with bodies in an extended position and offerings that include artifacts not previously registered in this zone.
			Zone UTM N 7956034	
	Colón-10	XV Region Municipality of Arica	Zone UTM E 367176	Mortuary space that has been set up as a site museum. Preservation of contexts with the presence of bodies with natural and artificial mummification and funerary goods displayed in situ.
			Zone UTM N 7877239	
			Zone UTM E 360404	Mortuary space composed by the simultaneous inhumation of bodies with and without complex treatment.
	Mirador La Virgen	XV Región Municipality of Arica	Zone UTM N 7956117	

• Table 5: Component 01 Faldeo Norte del Morro de Arica: Attributes of archaeological sites
SOURCE: INDIRA MONTT CHINCHORRO FILE 2018

Component 02: Desembocadura de Camarones

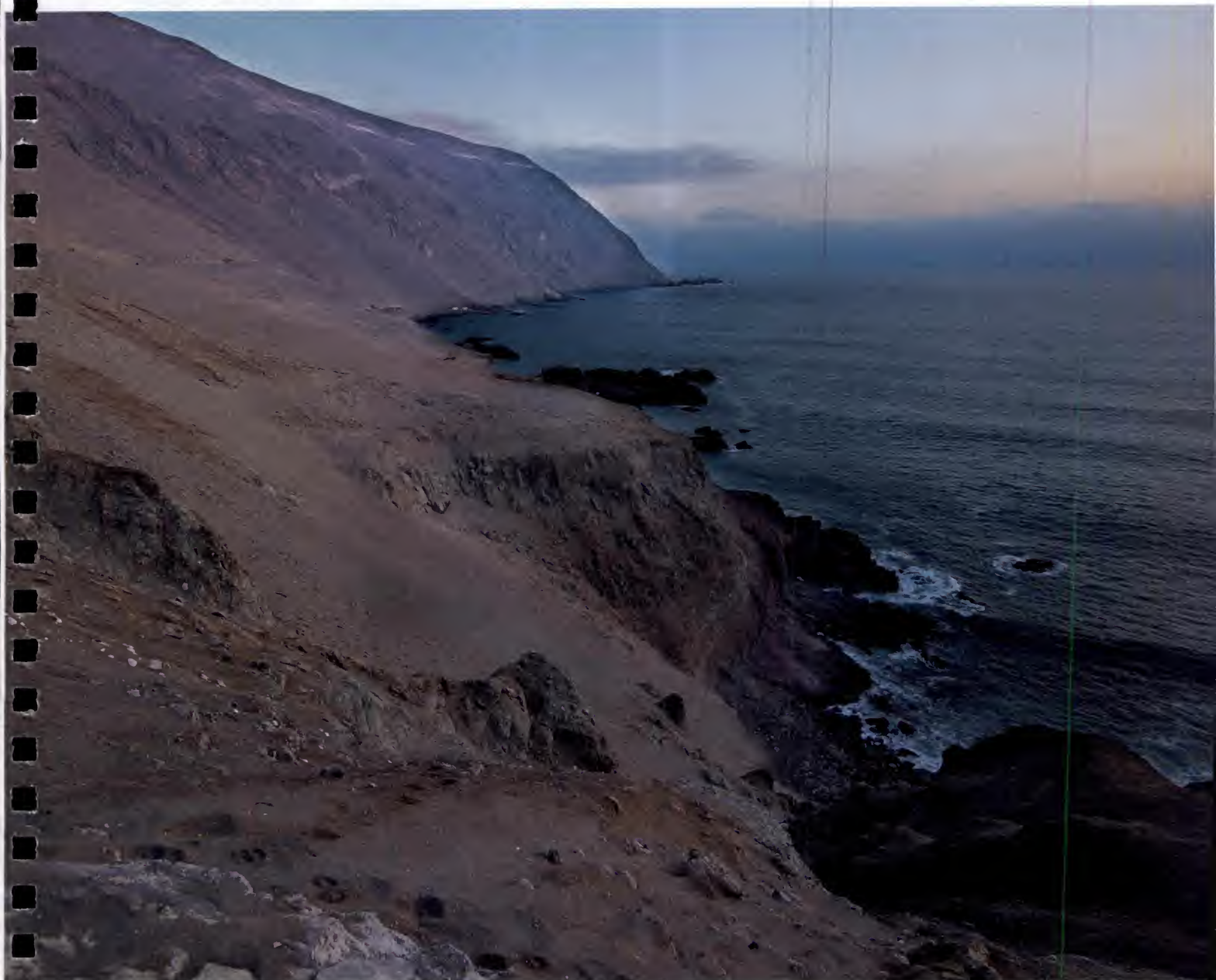
The mouth of the Camarones River (19°13' S Lat.; 70°16' W Long), is located on the lower section of the valley formed by the Camarones River, 82 km south of the city of Arica. It constitutes a natural landscape, which has not been urbanized, where the Property conserves most of the qualities that existed in times of the Chinchorro occupation, between 7000 and 2800 years ago. The littoral, wetland and coastal desert today are a close approximation to the cultural landscapes of the past (Figure 46).

In the area surrounding the mouth of the Camarones River, current surface runoff conditions generate a small lagoon adjacent to the beach area where the wetland is located.

The strip of beach that extends between the northern and southern border of the valley has approximately 1400 meters in length. Considering the section that continues south along the cliffs, the coastline at the mouth of the river is 3500 meters between Punta Norte in the north and Punta Camarones in the far south.

This area of the Camarones River's mouth is flanked by different terraces. The slope at the northern flank reaches elevations of nearly 600 m a.s.l. Archaeological sites are found on this hillside, on its base as well as higher up the hill, at different elevation levels until the land gives way to rock formations.

At the high part of the southern flank of the river's mouth there is a terrace, with elevations that surpass 600 m a.s.l. The northwestern slope of this terrace descends abruptly into the sea, generating a cliff zone called Acantilados Sur. These cliffs have an elevated slope and in the lower part are crossed by a road. At the base of the cliffs, the coast is rocky, narrow and rugged, and there is a small rock shelter there. The bay ends south in a point called Punta Camarones. The configuration of this area is the natural projection of southern and southwestern winds, which prevail in this area³⁵.



• Figure 46: View of the Acantilados Sur area where the different sites of Camarones 15 are located.
SOURCE: SITE CHINCHORRO, MANAGEMENT AND PROTECTION PLAN. UTA

Connected to the southern flank of the valley, there is a terrace called Terraza Sur, with heights ranging between 30 to 50 m a.s.l. On this plain there are numerous archaeological records, witness to the continuous occupation of the mouth of the valley.

Terraza Sur borders a lower, less developed terrace to the north, which rises 2 to 3 m above the course of the river, present on the northern as well as the southern riverbank. In addition, another younger terrace of small height (less than 1 m above the active stream bed) was identified on the riverbank. Vegetation in the river's mouth concentrates in this zone of "inferior terraces," associated to the river's humidity, and it contrasts vividly with the arid surroundings. Terraza Baja continues toward the northern border of the valley where the land rises again.

The Chinchorro archaeological sites that integrate the Desembocadura de Camarones component are located from Terraza Sur towards Acantilados Sur, even though the sites are representative of an occupation that comprises this entire territory, including sectors from across the valley¹⁸ (Figure 47).



• Figure 47: Landscape of the Mouth of the Camarones River from three different locations: Acantilados sur area towards the lower terraces; the coastlines, towards the sea and the cliffs; finally, general view from the northern slope towards the south. SOURCE: MANAGEMENT AND PROTECTION CHINCHORRO SITES PLAN.UTA.

The selection of this landscape to establish their domestic and funerary occupation bears witness to the conditions that made it attractive for marine fisher-hunter-gatherers of the Chinchorro cultural tradition: (a) the Camarones River is one of the scarce permanent watercourses in the region, so it secured access to this critical resource; (b) the river mouth's environment is an ecotone that combines a coastal, terrestrial and fluvial environment; (c) the wetland and shrub environment affords plant raw materials and specific fauna, in addition to the marine and coastal fauna that became the main component of the Chinchorro diet.

The extensive visual domain of the surrounding landscapes is evident from the sites of Desembocadura de Camarones and, to a lesser extent, Faldeo Norte del Morro de Arica: river mouths occupied on their southern margin.

In the Desembocadura de Camarones subcomponent, there are a series of funerary sites and, in contrast to Faldeo Norte del Morro de Arica, domestic areas are also present, which as a group is evidence of the beginning, the development, as well as the decline of the cultural development of the Chinchorro tradition. The settlement in Camarones must have been affected by symbolic factors associated to the placement of the funerary areas in proximity to the domestic areas. It is in Desembocadura de Camarones where, to date, mankind's oldest archaeological evidence of artificial mummification has been found (7000 BP).

In the area, there are also records of an extensive history of occupation by human groups from not only the Archaic Period, but also the Formative, Intermediate and Inca periods. These findings, in contrast to what happens with Faldeo Norte del Morro de Arica, testify to the continuous utilization of the different sectors of the river's mouth, during a period of time than spans from 7000 to 450 BP. Most of the archaeological sites that have been found until now are located in the area of Terraza Sur, although there are also archaeological findings in diverse points of the coast towards the south, along the cliffs and, to a smaller extent, in the northern margin of the valley.

The archaeological sites that have been identified in Camarones, despite their different names given according to the field work campaign, are located within limited sectors of a large archaeological site that is evidence of a continuous settlement in time and space^{18,114}.

Lastly, important occupations on the northern margin of the mouth of the Camarones River are recorded through the Chinchorro site in Camarones Punta Norte, a domestic shell midden, active between 6270-4950 BP^{57,123}.

Archaeological sites

- **Camarones 1 and Camarones 2 sites**

These sites of a domestic character are situated in a context that has been interpreted as a coastal camp which testifies to links to lithic workshops and the Conanoxa occupations, further inland in the Camarones Valley¹²⁴. Superficially, Camarones 1 and Camarones 2 are characterized by stone circles that reach 2 m in diameter¹¹⁴. Presently, on the surface of the site, it is possible to identify dense locus of cultural material similar to an *emplantillado* (a layer of stones resembling a cobbled floor). Among the visible material there are fragments of mollusks, lithic reduction debris and nearly a hundred grinding tools^{18,125}.

- **Camarones 14 and Camarones 17 sites**

The Camarones 14 and Camarones 17 sites represent a *continuum* of synchronous occupations by Chinchorro groups. It is the same site given different names corresponding respectively to the excavations done by Schiappacasse and Niemeyer¹¹⁴ or by Muñoz and collaborators¹⁸.

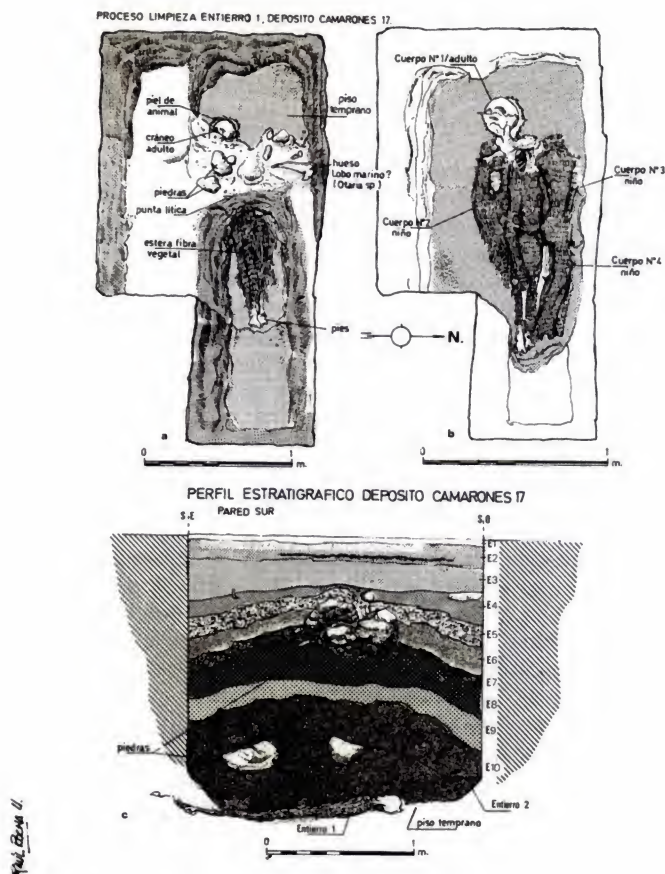
The archaeological work done in Camarones 14 revealed how Chinchorro groups adapted to this territory along with the emergence of their exceptional mortuary expressions. Six strata are recorded, the majority composed of dense conglomerates of mollusk and fish bones, in addition to burning events separate from the rest of the stratigraphy. Documentation on the different areas of recognizable activities in the site, including spaces dedicated to depositing the dead, was analyzed in a complete monograph on the site⁷².

The characteristic of mortuary practices in this site are evidenced by the finding of 23 individuals, buried collectively as well as individually, without offerings. Of the 23 individuals, only 5 bodies were almost completely artificially mummified, corresponding to secondary burials of neonates and infants. Among the multiple burials, there is a group made up of 3 infants, all of them with complex treatments, and a child and an adult male, both in their natural state, without artificial preparation (Inhumation N°8, 9, 13, 14 and 15). There is another group of bodies that stands out, comprised of an adult couple without artificial treatment and two children with artificial mummification (Figure 48), (Inhumation N°19, 20, 21 and 22).



- **Figure 48: Detail of mask of mummy with complex preparation from the Camarones 14 site.**
SOURCE: MONTT 2016 :296 FIG. 1⁷⁰

The Camarones 17 site, excavated a decade after the area corresponding to Camarones 14 was dug, is also a domestic settlement where 11 occupational strata were defined, of which strata 1 and 2 are ceramic and the remaining 9 are product of successive preceramic occupations. At the base of stratum 11, at 2 m deep, a funerary bundle was found containing the body of an adult female, without artificial preservation, and the body of 3 infants with artificial complex treatment, placed on the dead adult's chest¹⁸ (Figure 49 and 50).



• Figure 49: Stratigraphy and deposit profile of the Camarones 17 site.
SOURCE: R. ROCHA. PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY,
UNIVERSIDAD DE TARAPACÁ.



• Figure 50: Mummified fetus from Camarones 17.
SOURCE: ARRIAZA AND STANDEN 2016 :219 FIG. 3⁹⁸

The bodies of neonates and infants that were recuperated from the Camarones 14 and Camarones 17 sites mark the initial point of artificial mummification in the Chinchorro temporal sequence and constitute the first manifestations of artificial mummification in the world. In the context of these marine hunter-gatherer societies, a funerary art which was always centered on the special treatment of children, infants and full-term fetuses (perinatal) develops.

The Chinchorro artifactual material from Camarones 14 and Camarones 17 is numerous and comes from refuse areas; it is exceptional because it makes up one of the few early domestic artifactual records of the Chinchorro cultural tradition. Based on the study of artifacts and their distribution in this site, it was possible to reconstruct complete manufacturing processes of certain tools, such as fish hooks made from the shells of *Choromytilus chorus*.

The site has a multicomponent character. Subsequent to the Chinchorro cultural tradition, different cultural groups established here. These groups developed their domestic activities here, which is evidenced based on ceramic strata found over successive archaic strata that correspond to the Chinchorro tradition. This ceramic occupation corresponds to the Late Period or an interval of Incaic influence in the region. Currently, the site has great stratigraphic potential; viewed from the A-376 highway, it is possible to verify exposed profiles with archaeological material more than 1 m deep.

- **Camarones 8 Site**

This site is a multicomponent deposit where approximately 7 units were worked, reaching a depth of nearly 1 meter⁷². The site is composed of 2 superior strata with ceramic evidence and 4 preceramic, inferior strata. Among the preceramic strata, domestic refuse and housing structures were identified. The garbage dump was almost entirely made up of mollusk refuse, fish bones and bones from marine mammals. The artifacts found in these strata correspond to technologies for marine resource exploitation, such as lithic knives with handles, harpoons and fishhooks. In stratus 5, a habitational structure was found, suggesting that the garbage dump was also a residential area^{72,84}. These structures are described as being dug-out, separate from one another, representing a disperse pattern. These structures were covered with large cobble stones to form walls and are associated to mortars and hearths⁸⁴.

At the base of stratus 6, at a depth of 1 m (Figure 51), the body of a male infant was found without complex preparation, in an extended dorsal position. The face was painted red, the thorax was covered by the skin of a marine bird and from knees to feet, he was wrapped in double yarn spun from camelid fibers.

Currently, the site has great stratigraphic potential, for dense distributions of mollusks and lithic material are visible on the surface⁷².



- **Figure 51: Deposit plan and profile of the Camarones 8 site.**

FUENTE: R. ROCHA. PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

- **Conchal Sur or Camarones Sur Site**

An enormous artificial deposit of refuse, mainly shells⁸⁴, has been linked to Chinchorro cemeteries in Camarones 15E and Camarones 15D. Two units were excavated, one of which displayed great depth. The site's stratigraphic sequence, which includes strata 1 to 17, has records of preceramic occupations of an early period, including conical mortars and pestles, as well as the development of fishing gear that includes fish hooks, stone sinkers, barbs, balls, cotton fishing lines, net bags (*chinguillos*), and harpoons, among others. Rivera indicates:

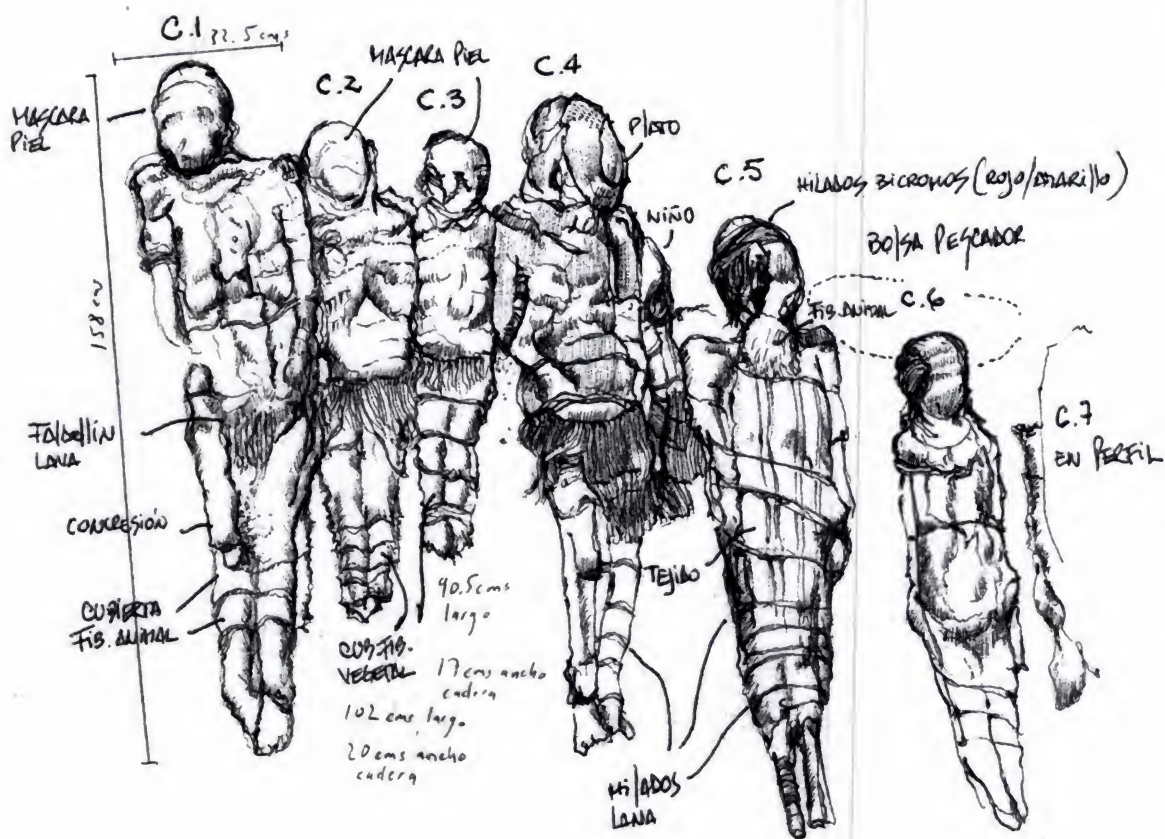
"It is worth noting that adjacent to the site, the motive of our study, a Chinchorro type cemetery is located toward the south and another site with habitational areas toward the north, in addition to the Camarones-15 site toward the east, on the main slope of the coastal cliff"^{46:5}.

The importance of the Conchal Sur site is huge due to the scale of the natural/cultural deposits and its scientific, archaeological and geoarchaeological value.

After the preceramic component, in Conchal Sur there is evidence of later occupations, corresponding to a transitional period with late preceramic components and scarce records of early ceramic and wool textiles. Finally, above these transitional strata, there are ceramic levels where the occupation corresponds to Regional Development with San Miguel-type ceramic (ca. 1150-750 BP).

- **Camarones 15 Site (Figure 52 and 53)**

- **Camarones 15A and Camarones 15B**⁷¹. These sites are located, respectively, in the upper and lower part of the vehicular road that leads to Caleta de Camarones. It is in these sectors where evidence of a population with similar cultural characteristics is recovered, with records of 24 post-Chinchorro bodies (Camarones 15A), that belong to an early ceramic period, and several refuse deposits associated to hearths. The strata that make up this refuse deposit are, almost entirely, preceramic (Camarones 15B). The cultural remains of strata 2 to 6 show the presence of hearths associated to logs and sea lion skins, which has been interpreted as a possible area of residence. It is likely that stratus 4 of the refuse area of sector A could have been linked to the inhumations with artificial treatment described for sector C.
- **Camarones 15C**^{55,74}. In this sector, situated on a curve of the cliff, below the vehicular road that leads to the small cove, 7 adult bodies were rescued from the preceramic component, all of them lay in an extended position, without artificial treatment. Among the grave goods, malachite beads and wool headdresses, appear in large numbers covering the craniums and have not been found in other Chinchorro contexts in Arica or Camarones.
- **Camarones 15D**⁵⁵. This site, which is located in direct relation to sector C, displays features from the last phases of the Chinchorro cultural tradition. The bodies are extended, partially exposed to fire, with clay facial masks in black and red, of a less finished execution, and wigs⁷⁴. People were accompanied by different offerings that were not registered in other sites, like net bags made from vegetable fibers with geometric designs made with human hair and red wool fibers, miniature textiles made of camelid wool in natural colors, lapis lazuli diadems and copper pectoral ornaments. This sector represents a final phase of the Chinchorro cultural tradition^{55,74,82,115,125}.
- **Camarones 15E**^{55,82,95,115}. In this site, located on the highest level of the hillside, there are records of bodies of infants without artificial preparation, but with clay masks on the faces, extended over wooden elements (child carriers). Adults, lacking artificial treatment, some with ochre and red earth at the height of the face, were registered along with the children. Just like in the other sectors of the site, there are distinctive features recorded in the grave goods, this time corresponding to headdresses with tropical bird feathers.



• Figure 52: Camarones 15d site. Group of Chinchorro bodies.
SOURCE: R. ROCHA. PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ



• Figure 53: Location of the different excavated sites in the area surrounding Camarones 15. The following sites are located left of the road, toward the cliff, north to south: Camarones 15b, Conchal sur and Camarones 15c. To the right of the road, on the hillside and north to south, Camarones 15a, Camarones 15e and Camarones 15d.
SOURCE: PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

ID N°	NAME OF SITE	REGION	COORDINATES OF CENTRAL POINT	ATTRIBUTE
Component 02. Desembocadura de Camarones	Camarones-1 (Cam-1)	XV Región Municipality of Camarones	Zona UTM E 368557	Site of domestic character similar to Camarones-2, associated to preceramic occupations from inland. Today, circular stone structures and a great number of mortars are observed on the surface.
			Zona UTM N 7877696	
	Camarones-2 (Cam-2)	XV Región Municipality of Camarones	Zona UTM E 368368	Site of domestic character similar to Camarones-1, associated to preceramic occupations from inland. Today, circular stone structures and a great number of mortars are observed on the surface.
			Zona UTM N 7877685	
	Camarones-14 (Cam-14) Camarones-17 Ca-17	XV Región Municipality of Camarones	Zona UTM E 367176	Domestic space with associated funeral assemblage, corresponds to the oldest registered Chinchorro site to date (7420 AP), and it possesses mankind's oldest artificially mummified bodies (7000 AP).
			Zona UTM N 7877239	
	Camarones-8 (Ca-8)	XV Región Municipality of Camarones	Zona UTM E 367482	Multicomponent deposit of domestic refuge and shells, where in its preceramic strata the remains of housing and inhumations were found.
			Zona UTM N 7877335	
	Conchal Sur (Cam-Sur)	XV Región Municipality of Camarones	Zona UTM E 366763	Domestic site consistent with a garbage dump where activities related to grinding gain relevance.
			Zona UTM N 7876565	
	Camarones-15A (Cam-15A) Camarones-15B (Cam-15B)	XV Región Municipality of Camarones	Zona UTM E 366881	Archaeological site with different cultural components. Post-Chinchorro mortuary space that documents the incorporation of new cultural features to the region. It is found adjacent to a refuse area whose preceramic levels are associated to a late phase of the Chinchorro cultural tradition.
			Zona UTM N 7876685	
	Camarones-15C (Cam-15C)	XV Región Municipality of Camarones	Zona UTM E 366653	Mortuary space that testifies to the last phases of the Chinchorro cultural tradition. Bodies without complex treatment, with mud masks and offerings that include a large number of textiles.
			Zona UTM N 7876340	
	Camarones-15D (Cam-15D)	XV Región Municipality of Camarones	Zona UTM E 366774	Mortuary space that testifies to the last phases of the Chinchorro cultural tradition. Bodies without complex treatment, with mud masks and offerings of artifacts of foreign origin.
			Zona UTM N 7876340	
	Camarones-15E (Cam-15E)	XV Región Municipality of Camarones	Zona UTM E 366916	Mortuary space that testifies to the last phases of the Chinchorro cultural tradition. Bodies without complex treatment, with mud masks, infants extended over wooden elements and offerings of artifacts of foreign origin.
			Zona UTM N 7876511	

• Table 6: Component 02 Desembocadura de Camarones: Attributes of the archaeological sites.
SOURCE: INDIRA MONTT CHINCHORRO FILE 2018

Multicomponent Sites and Post-Chinchorro Occupations

In all of the archaeological sites that are part of each of the Property's components, the initial occupation corresponds to the Chinchorro cultural tradition. Later, occupations from the Formative Period up to the Late Period occur. This happens mainly in the archaeological sites of the component Desembocadura de Camarones, where, in contrast to what occurs in Faldeo Norte del Morro de Arica, archaic sites show signs of reuse by populations culturally different from the Chinchorro that came later (Figure 54).



• Figure 54: Map of location of archaeological site from Faldeo Norte del Morro: it illustrates the occupation area of the archaic, formative and late intermediate periods (provided by the archaeologist Rolando Ajata, 2009).
SOURCE: PM MORRO 2012 :111 FIG. 22²⁸

Sites and Evidence from the Formative Period

The Formative Period is characterized by the beginning of agriculture in the region, something particularly evident in the Camarones 15 site. Habitational camps are found contiguous to the cemeteries; in the later, the bodies are found with legs bent forward and as offerings there are globular ceramics and smooth surface, wool textiles with colorful stair motifs, metallic objects and decorated basketry with geometric and zoomorphic motifs. Cultigens are incorporated in an important manner, leading to a mixed economy, meaning, an agro-maritime economy⁵⁵.

- **Camarones Conchal Sur:** This site has a transitional period, with late preceramic components and scarce records of early ceramic and wool textiles. Evidence is situated between *ca.* 3450 BP and 2450 BP.
- **Camarones 15 A and B:** A unit corresponding to the Formative Period was registered here, defined as such mainly due to the presence of initial ceramic, loom-woven textiles and inhumations in a flexed position. A refuse deposit was also excavated, where the remains of domestic occupation (refuse of marine origin, plants, remnants of terrestrial hunting, remains of goods made from plant fibers, shells, cactus and others)¹²⁸.

There are records of 24 post-Chinchorro bodies. All inhumations are characterized by the presence of a wooden pole positioned vertically, a feature of the new forms of burial. Adults lie deposited in a dorsal position, with the legs flexed and the head-oriented NE and SE. The bodies are covered by twined mats made of plant fibers, some with wool embroidery. Under the mats the bodies appear covered in thick blankets made from camelid fibers. In some cases, they are dressed in sleeveless shirts or tunics and/or *faldellines* and loincloths made of plant fibers. The blankets and shirts are decorated with stripes in dark colors. The craniums have turbans made of camelid fibers in varied colors and, in other cases, thick spun yarn that covers the forehead completely¹²⁸.

Several artifacts made from plant fibers were recorded as offerings: fishing line, bags, plate- and *puco*-shaped basketry which have geometric designs in black and red, fish hooks made from cactus spines, *chopes* (bone tools to open mollusks), harpoons, darts and wooden bows, pyro-engraved pumpkins, tubes to insufflate psychotropic substances and ceramic vessels with globular shape.

There is a recorded date of 2840 BP, obtained from a ceramic piece from Tumba 5¹²⁸.

Sites and Evidence from the Late Intermediate and Late periods

The Late Intermediate and Late periods at the mouth of the Camarones River display a coexistence of diverse traditions and cultures manifested in different types of materials.

- **Camarones Conchal Sur:** The presence of different ceramic levels, whose occupation corresponds to Regional Development with San Miguel-type ceramic, with a chronological framework that spans from *ca.* 1150 to 750 BP^{111,129}, were found.
- **Camarones 8:** Burials with bodies in lateral and dorsal positions, wrapped in colorful blankets with striped decorations were recorded. Gentilar ceramic was found among the offerings¹³⁰.
- **Camarones 14:** The upper strata of this site correspond to the Inca Period. Various objects were registered, among which were fragments of Inca and Saxamar style ceramic, wool and loom-woven textiles, wooden *torteros*, needles made from cactus spines, twined mats and basketry made of plant fibers, twisted and braided cordage, peduncular points for harpoons, fish hooks and sheets of copper, and clay molds to melt copper. The presence of crops like maize, pumpkin and cotton was recorded¹⁸.
- **Geoglyphs:** Two geoglyphs from the Late Period have been recorded at the mouth of the Camarones River. The first one is located inside the valley, 6 km from the mouth of the river, and corresponds to a panel of camelid figures formed using an additive technique with large stones (*emplantillado*). The second one is a circular figure located at the top of the southern slope of the river's mouth, created through a subtractive technique and possessing red pigment on its borders. Both geoglyphs are related to trails that connect the river's mouth with the intermediate sector of the Camarones Valley¹³⁰.

2.a.vi. Chinchorro Chronology and Settlements

Each component, Faldeo Norte del Morro de Arica de Arica and Desembocadura de Camarones, has delivered complementary pieces for the comprehension of the settlement of Chinchorro groups in the Arica y Parinacota region. Thus, milestones can be outlined in the occupational sequence.

Chinchorro occupations begin in the locality of Camarones, in the Camarones 14 and Camarones 17 sites (7420 to 6780 BP)^{18,84}. They correspond to domestic sites that integrate funerary areas with the first signs of artificial mummification in the history of mankind.

Occupations continue in the locality of Arica, with funerary manifestations in *chimbos* or interfluvial plains close to the mouth of the San José de Azapa River. Records of the first funerary deposits of Arica are found on this interfluvial plain with terraces, quite close to the coast, with people who were artificially mummified through modeling and covering in black paint, in sites like Chinchorro 1 (6070-5560 BP) and Maestranza Chinchorro (5453-5060 BP)^{65,104}, in addition to those recorded in Maderas Enco (4750 BP). At the same time, the first occupations around Morro de Arica are recorded in sites located on the slopes of its western flank, on the coast, which is evident in the shell middens of Quiani 1 (6170-5630 BP)¹¹⁰, Quiani 9 settlement camp (6115-5250 BP), and Playa Miller-8 funerary site (5744 BP)⁶⁵.

It must be noted that no Chinchorro sites prior to the dates reported for Quiani³⁴ have been recorded on the coast of Arica. This could be due to the rapid rise in sea level that occurred between 6000-5000 BP and the consequent oscillations of the coastline, eliminating coastal platforms, which are already scarce in the region. Before that time, said platforms could have even facilitated the movement of groups along the coast¹⁶. Thus, it is possible that earlier evidence of camps on the coast could have been lost, something that did not occur to the sites of Terraza Sur in Camarones, due to their higher location on the headland.

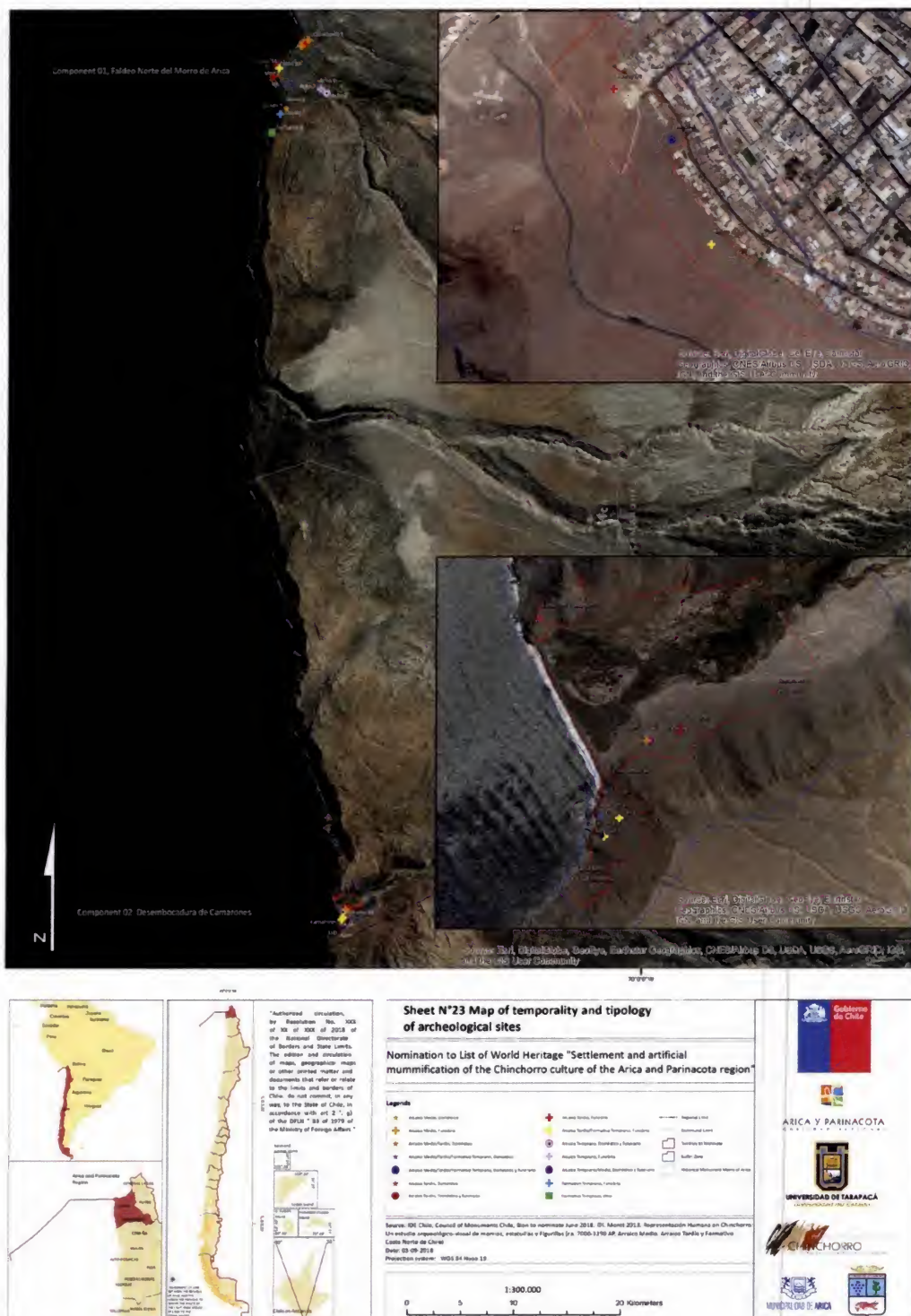
At Faldeo Norte del Morro, the Morro 1 site (5434-3488 BP) becomes the scene of ceremonial practices and burials, commencing the formation of one of the most populous and exceptional archaic cemeteries of the Atacama Desert. The bodies that were initially deposited in this ritual space correspond to Modeled/Black mummies, which changes towards 4500 BP with the inhumation of Filled/Red bodies. At the same time, at Desembocadura de Camarones, sites like Conchal Sur (5640-3060 BP) are being intensely occupied.

The settlement of a domestic character in the locality of Arica records its latest dates towards 5250 BP (Quiani 9). Since that time, there is evidence of occupations that occur exclusively at Faldeo Norte del Morro, all of them funerary. In addition to Morro 1 (5434-3488 BP) there are other cemeteries with bodies with complex preparation and a diversity of types of treatments: Morro 1/5 (4120 BP), Colón 10 (relative chronology of 4000-3700 BP)²⁸ and Morro 1/6 (4310-3560 BP), a mortuary space with only one person without artificial treatment and that manifests the height of new ritual practices associated to the consumption of psychoactive substances.

At Desembocadura de Camarones new burial sites appear, with less complexity in the artificial treatment of bodies but with an important display of textile material and extraordinary elements, probably markers of social

distinction. Such new sites include Camarones 15D (4240-2840 BP), located in the area of the western cliffs, near Conchal Sur domestic camp (5640-3060 BP).

Lastly, toward the end of the cultural sequence of Chinchorro occupations, while sites like Morro 1 and Morro 1/6 were all in disuse, new occupation enclaves associated to artificial treatment of bodies (of Filled/Red type), this time in the southern end of the Chinchorro dispersion area (locality of Iquique, Tarapacá region, 3484 BP). The groups that settled there and the inhabitants of Camarones 15D and Camarones 15E sites are the ones who actually carried out the change towards the production of food, the integration of technological innovations, a new social order and new beliefs and world visions, manifested in the cease of *post mortem* artificial treatment and the implementation of new burial patterns.



• Sheet 23: Map of temporality and typology of archeological sites.
SOURCE: ADAPTED FROM MONTT 2014.

2.b History and Development

2.b.i. Environmental Development of the Property

The coastline between 18° and 19° S in northern Chile is characterized by its conditions of extreme aridity, the abrupt relief of the Coastal Cordillera and the development of littoral plains of small extension.

Diverse geological, geomorphological and climate studies have revealed that the conditions of hyperaridity of the Atacama Desert began developing in the Middle Miocene (ca. 13 Ma¹), with an important aridification phase in the Upper Miocene and another in the Pliocene (ca. 4 a 3 Ma)¹⁻⁴. This indicates that conditions of hyperaridity in the Atacama Desert predate human occupation, however, it is important to consider that during the Upper Pleistocene and the Holocene variations occurred on a smaller time scale that generated episodes of greater humidity in comparison to the current climate⁵⁻⁸.

Available geological and geomorphological information indicates that the main geomorphological features of Faldeo Norte del Morro de Arica and Desembocadura de Camarones have remained stable during the last millennia. Although local variations must have occurred due to great earthquakes, landslides and other geomorphological processes, the general configuration of the environment in which the life of the Chinchorro groups developed has been similar since the beginning of the occupation: a coastal desert with the abrupt reliefs of the Coastal Cordillera and flat areas formed by alluvial environments and the mouths of rivers.

While variations of the sea level have occurred during the Holocene and, therefore, of the position of the coastline, available information indicates that this would not have significantly affected the environmental configuration of the Property.

The Faldeo Norte del Morro de Arica component has three main relief features that have maintained a similar configuration since the beginning of the occupation by Chinchorro groups (see chapter 2a): Morro de Arica, a relief that forms the northernmost part of Coastal Cordillera, extensive alluvial plains associated to the mouths of the San José and Lluta rivers, and narrow littoral plains.

The Desembocadura de Camarones component also has an environmental configuration like that which existed during the occupation, because the formation of the main geomorphological units of the component (terraced levels associated to the Camarones River, Terraza Sur, the slopes of Acantilado Sur (southern cliff) and inferior fluvial terraces) occurred before the development of the occupation (see chapter 2a).

2.b.ii. Main Natural Hazards that have affected the Property in the Past

This section details the principal natural phenomena that have affected the Property during the last millennia.

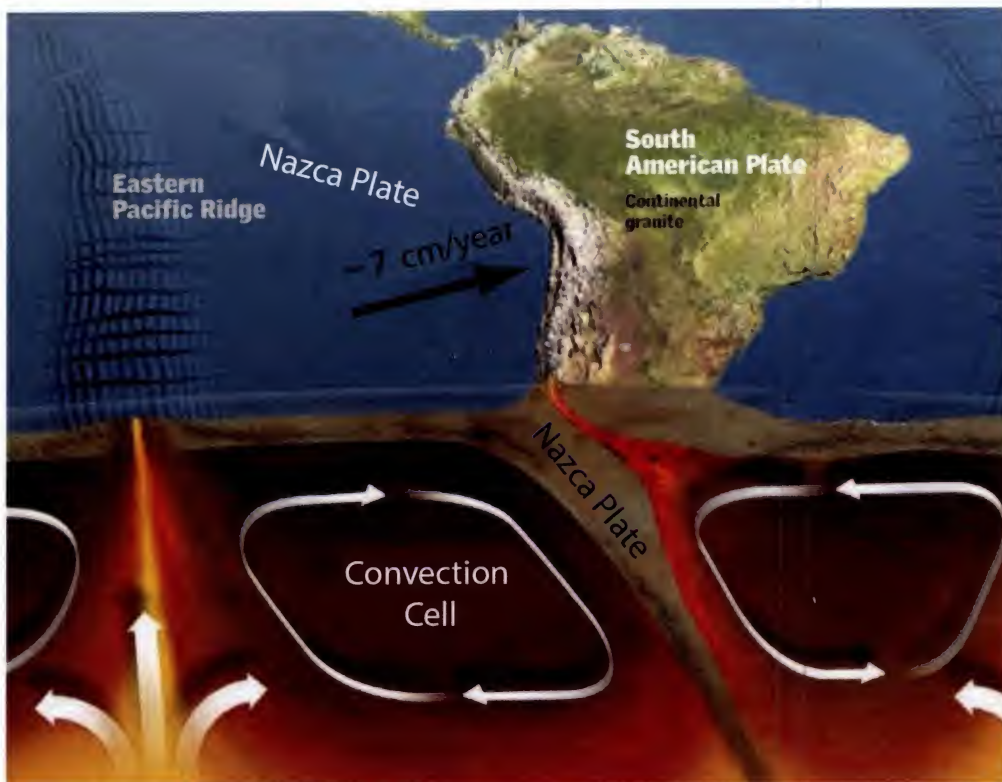
Seismicity

Chile is located on an oceanic-continental convergent plate boundary, where the oceanic plate (Nazca Plate) is subducting beneath the western margin of the South American Plate ⁹ (Figure 55). This subduction, estimated to have a current rate of 8 cm/year ¹⁰, is recognized as active since at least the Jurassic Era ¹¹.

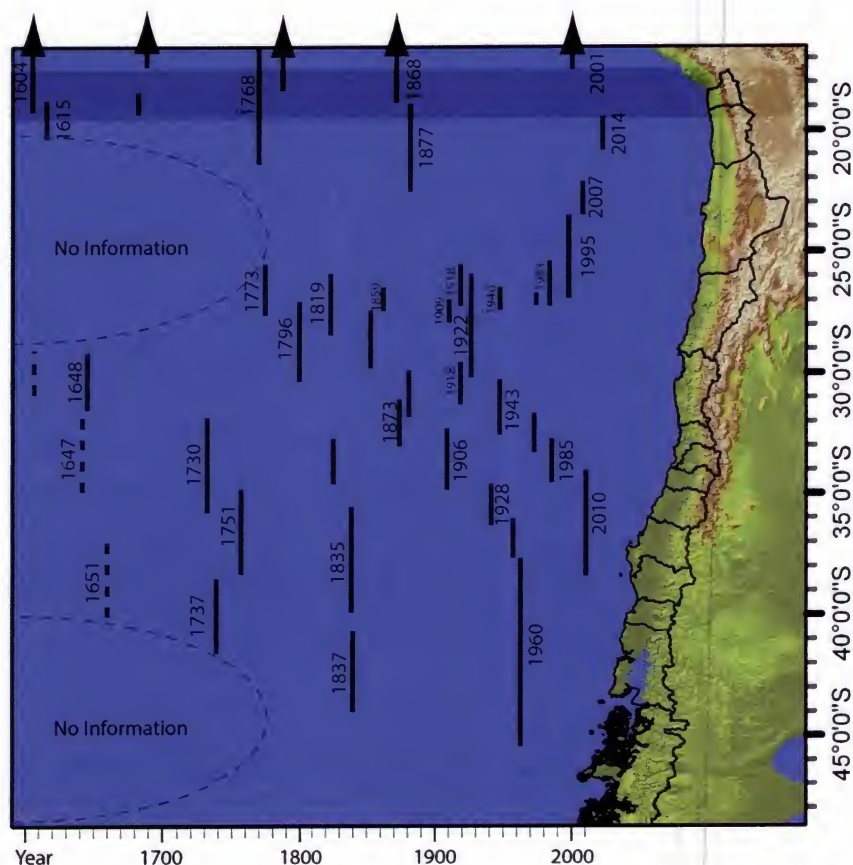
The accumulation and subsequent release of the stress product of this subduction regime is the cause of frequent earthquakes along the entire country, north of the Taitao Peninsula.

Historical Seismicity

In general, the entire northern margin of Chile is characterized by intense seismicity, as exemplified by the successive earthquakes that have affected the cities of Arica, Iquique and Antofagasta, for which there are records since the Spanish conquest (Figure 56). These earthquakes found in the historical record correspond to subduction or interplate earthquakes, which are produced by the release of energy accumulated due to plate convergence.



• Figure 55: Chile's geodynamic context and subduction margin
SOURCE: MODIFIED FROM ENCYCLOPEDIA BRITANNICA (2008)



• Figure 56: Historical subduction earthquakes with an estimated and calculated magnitude greater than 7.2 and their rupture areas. Solid lines indicate properly identified rupture zones, dashed lines indicate rupture zones inferred from historical data
SOURCE: MANAGEMENT AND PROTECTION CHINCHORRO SITES PLAN.UTA.

The main historical earthquakes that affected the study area are listed in Table 7.

EARTHQUAKE	DESCRIPTION
Earthquake - November 24, 1604	"First earthquake in historical record, identified by experts as a major event with a destructive tsunami and estimated magnitude of $M \approx 8,4$ (Comte, et al., 1988). The historical data speaks of almost complete destruction of the city and due to the tsunami, the city was rebuilt at the foot of El Morro de Arica (Urrutia and Lanza, 1993)."
Earthquake - September 16, 1615	"According to records, this event was very destructive for the region, destroying the majority of buildings, however, there were no reported fatalities (Urrutia and Lanza, 1993). The magnitude of the earthquake is assumed to be around $M \approx 8,0$ (Comte, et al., 1988)."
Earthquake - May 13, 1784	"Historically, this earthquake is known as the great earthquake of Arequipa, because it severely affected that locality and the towns located within a radius of 100 kilometers (damages in the region were not informed). For this earthquake an average magnitude of $M = 8,4$ and a depth of focus of 40 kilometers is estimated. There is no information that this event generated a tsunami, which is reasonable because the epicenter was not on the coast (Comte, et al., 1988, Monge and Mendoza, 1993)."
Earthquake - August, 1868	"Earthquake that affected southern Peru and northern Chile with tsunami beached Wateree 800 m inland. The event was well documented and with accurate data, because it was studied extensively. Comte et al., (1988) assigns the epicenter the following coordinates: 17.80° S, 71.60° W, estimating a depth of 10 kilometers, with a magnitude $M = 8,5$ based on a complete list of reported Modified Mercalli intensities (Comte, et al., 1988). Reports indicate that in Iquique this earthquake was also devastating, and that the tsunami destroyed the main port buildings, water condensers, saltpeter warehouses and the pier."
Earthquake - May 10, 1877	"Almost a decade later, near 10:00 pm, the zone of Arica and Iquique was once again hit by an earthquake and tsunami. The magnitude is estimated to have been $M = 8,7$. Considering the reported damages and the generated tsunami, a depth of 10 kilometers was estimated (Comte, et al., 1988). In terms of material damages and human losses, there were 5 reported dead and a partial destruction, albeit important, of the city. The tsunami arrived to Arica's coasts one hour after the earthquake with 20-meter-high waves, dragging Wateree back toward the coast, leaving it beached in Las Machas (Urrutia and Lanza, 1993). There were also heavy seas down to Puerto Montt (southern Chile) and even Australia, New Zealand and Japan. The destruction associated to the tsunami generated by the earthquake is well recorded in southern Chile, arriving to the coasts of Concepción the next morning, in Tomé at 12:30 am, low tide succeeded high tide which fluctuated 1,2 m in comparison to regular tides. In Talcahuano, the sea receded 200 m and then came a rising tide 1,1 m higher than the line of high tide, succeeded by slow waves that reached a maximum height of 1,95 m. The sea remained with high amplitude fluctuations for 3 days."
Earthquake - June 23, 2001	"After many decades of seismic silence, this devastating event occurred that caused the loss of many human lives and material loss in southern Peru. According to data from RESISTE ARICA (Telematic Seismographic Network of Arica), the epicenter had the following coordinates: $15^\circ 54.4' S$, $73^\circ 37.3' W$, 33 kilometers deep and magnitude $M = 8,2$. The earthquake caused a tsunami that was only felt by some localities on the Peruvian coast, causing small anomalies in sea level in Chilean coasts (Boroschek, et al., 2001). This same earthquake caused greater damage in Peru, although in the Arica and Parinacota region and Tarapacá region it also caused substantial damages. In Arica, 500 people were affected, 20 lost material possessions, 5 were injured, 159 destroyed homes, 240 with greater damage, cut off roads and damage to road and port infrastructure, whose repair costs escalated to 395 million Chilean pesos (ONEMI, 2001)."
Earthquake - June 13, 2005	"It is an intraplate earthquake, the epicenter was located near the border with Bolivia, at a depth of 111 kilometers and a magnitude of $M = 7,9$. The earthquake caused the death of 11 people and 6018 people lost their homes, mainly in rural localities near Iquique. The main structural damages were suffered by adobe houses and buildings. In all of the region there were landslides that cut land communications and left many towns isolated, in addition to both water supply and electricity being cut off (ONEMI, 2005)."
Earthquake - April 1, 2014	"The earthquake of greatest intensity (VIII Mercalli) between the regions of Arica and Parinacota, Tarapacá and Antofagasta, according to the information supplied by the National Seismological Center, the earthquake reached a magnitude of $M_w=8,2$, causing ONEMI to solicit the preventive evacuation and to establish a tsunami warning for the entire national coastline, according to the indications by SHOA."

• Table 7: List of historical earthquakes registered in Chile between 18° and $25^\circ S$
SOURCE: MANAGEMENT AND PROTECTION CHINCHORRO SITES PLAN.UTA. BASED ON DIVERSE AUTHORS 12; 13; 14; 15; 16; 17

• Main recognized seismic sources

The area comprised by the Property and the buffer zone have been affected by earthquakes from three main seismogenic sources: (1) interplate thrust-type events, (2) intraplate or inslab events of intermediate depth, (3) and crustal events, which are described below.

• Interplate thrust-type earthquakes (subduction earthquakes)

This type of earthquake is produced by the contact between the Nazca Plate and the South American Plate, because of the stress involved in the subduction process. These types of events reach great magnitudes and are the type of earthquake that could potentially generate tsunamis. Earthquakes of this type that have affected the study area are shown in Figure 56.

- **Intraplate earthquakes**

This seismic source corresponds to earthquakes that occur within the Nazca Plate, proximal to the subduction zone interface, occurring at depths greater than 50 km and up to 150-200 km.

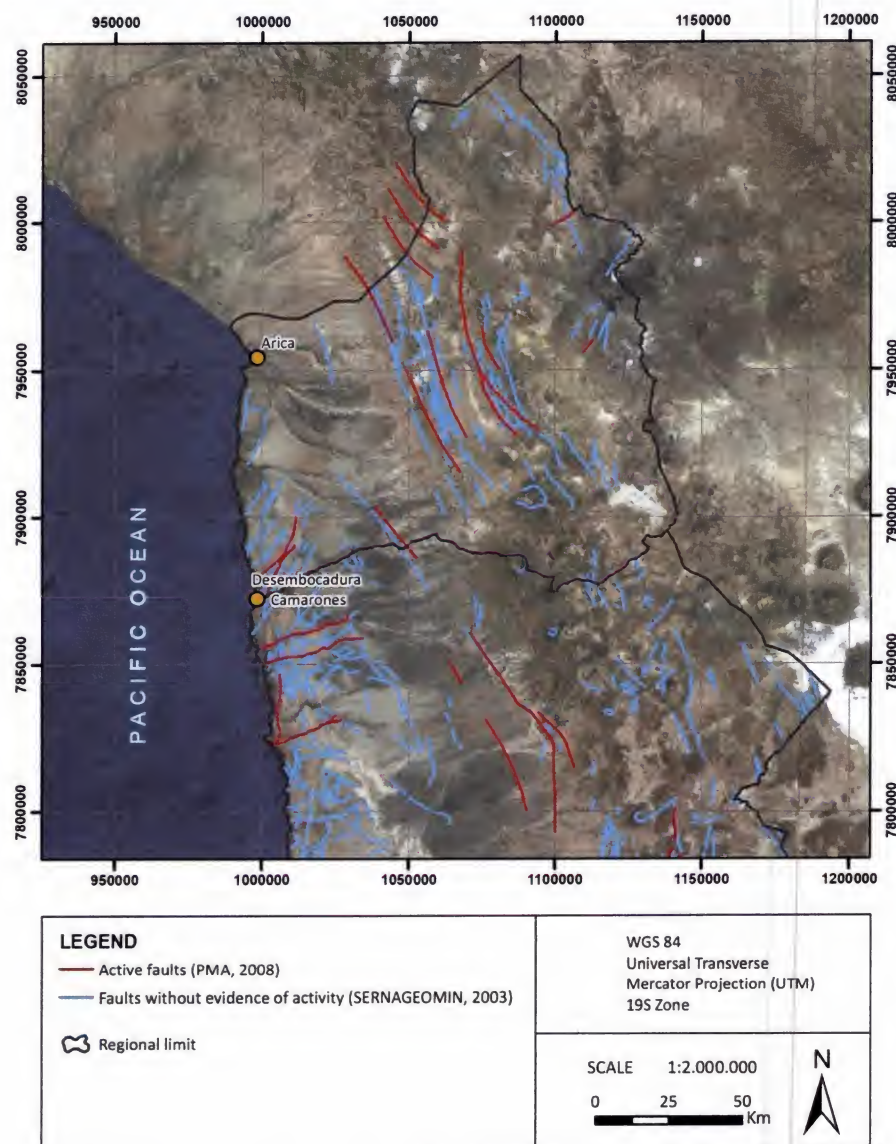
There are no existing historical records of intraplate earthquakes of a significant magnitude in the region, however, records of such earthquakes exist in areas south of this region (Calama 1950, MS=8; Tarapacá 2005, MW=7.5). These events are like the earthquake that occurred in Chillán in 1939, the deadliest and most destructive earthquake in Chile's history. Therefore, this seismic source should not be dismissed.

It is worth noting that there are no detailed records of large intermediate-depth, intraplate earthquakes before 1950, due in large part to the limitations of instrumental and historical records

- **Crustal earthquakes**

Within the Property, in the Camarones 14 archaeological site, there is an active fault that registers activity after 7000 BP and displays no evidence of movement after the late agricultural-ceramic occupation¹⁸. The information available does not suffice for knowledge of its seismic potential.

Conversely, studies on a national scale indicate the presence of an active fault system immediately north of the mouth of the Camarones River and other fault systems with evidence of activity approximately 16 km south of the same valley¹⁹. This means that although there are no historical records that indicate movement of these faults and the consequent generation of crustal earthquakes, there is evidence that these faults would have presented activity at least during the Quaternary and could thus be potential generators of crustal earthquakes in the future (Figure 57).



• **Figure 57: Map show active faults and faults with no evidence of activity.**
 SOURCE: MANAGEMENT AND PROTECTION CHINCHORRO SITES PLAN. UTA. BASED ON PMA¹⁹ AND SERNAGEOMIN²⁰

Volcanism

Within the Arica and Parinacota region there are records of volcanic activity that has occurred continuously from the Miocene (ca. 20 Ma) to the present. This activity concentrates in the Western Cordillera and to a lesser extent in the Altiplano and the Eastern Cordillera, at least 100 km east of the Property. Although this activity has had no direct effects on the Property due to its distance, it could have had indirect consequences for both components of the Property possess a hydrographic connection with the Western Cordillera where the current volcanic arc is located. Among the possible indirect consequences of this volcanic activity are alterations in the hydrological regime of the rivers, contamination of water that comes from rivers and the alteration of ecosystems in the region. The eruptive centers that have a record of historical activity are shown in Table 8.

VOLCANO	LOCATION	HISTORIC ACTIVITY	DATE	REFERENCES
Parinacota	18°10'S - 69°09'W	In the main stratocone, only permanent active fumaroles are known	-	Salas et al., 1966; González-Ferrán, 1966, 1967, 1969; Katsui and González-Ferrán, 1968; Worner et al., 1988; Francis and Wells, 1988; Davidson et al., 1990; Aguirre, 1990; López-Escobar et al., 1991; Bisso 1991
Volcanes de Ajata	18°12'S - 69°09'W	No records, however, there are Aymara and Quechua legends that would indicate pre-Columbian activity	-	González-ferrán, 1966, 1967, 1969, 1974; Niemeyer, 1963; Katsui and González-Ferrán, 1968; Worner et al., 1988; Aguirre, 1990; López-Escobar et al., 1991
Guallatiri	18°25'S - 69°10'W	Ejection of incandescent tephra and gases	First half of the 19th century	Sapper, 1917; Riso Patrón, 1924; Navarrete, 1936; Urizar, 1937; Vila, 1939; Brüggén, 1950; Casertano, 1963, González-Ferrán, 1966, 1974, 1987; Katsui and González-Ferrán, 1968; SEAN, 1985, 1987; de Silva and Francis, 1991
		Ejection of incandescent tephra and gases	1913	
		Ejection of incandescent tephra and gases	jul-59	
		Reactivation with phreatic eruptions	1960	
		Intense fumarolic activity	dic-87	

• **Table 8: Active volcanoes that have historical activity between 18° and 19.5°S.**
Source: ^{17, 21}.

Mass Movements

In the Property there are several records of mass movements that affect both components. The main types of mass movement identified are soil slides and rock falls. The processes involved in the mass movement observed for each component are detailed below.

• Faldeo Norte del Morro de Arica Component

In this component there are records of historical and prehistoric mass movements in the Property as well as in the buffer zone.

Within the Property, specifically in the Reserve 2 sector, Sitzia²² has identified bodies that are possibly in a secondary position due to the action of landslides that occurred after their burial.

Within the area contemplated in the buffer zone, on the western slope of El Morro, diverse studies identify mass movements, mainly rock falls, triggered by the different earthquakes that have affected the city of Arica. These phenomena have generated diverse damages, including the loss of human lives and damage to road infrastructure (Table 9).

EARTHQUAKE TRIGGER	MAGNITUDE	DESCRIPTION OF EVENT	REFERENCES
Earthquake - June 23, 2001	M = 8,2	Rockfalls on western flank of El Morro. Detachment of blocks of meters in diameter fell on talus and on San Martín Avenue. A block of approximately 1/2 ton bounced over the avenue onto the other side. Several fractures in cliff and summit bedrock developed notorious widening. Formation of new cracks in limited minor blocks due to main fractures in rocky promontory.	Naranjo and Villarroel (2001)
Earthquake - June 13, 2005	M = 7,9	Numerous rocky blocks fell from western slope of El Morro (estimated total volume of 15 m ³). Event caused one fatality.	Hauser (2006)
Earthquake - April 1, 2014	Mw = 8,2	Minor reactivation of landslide on the cliff side of El Morro, in front of Playa El Laucho (beach).	Ortiz and Velásquez (2014); Falcón et al. (2014)
		Rockfalls affected San Martín Avenue in the area of the western cliff. Blocks that fell range from decimeters to meters in diameter. Construction work retained fallen material and only some blocks reached the road.	Ortiz and Velásquez (2014); Falcón et al. (2014)

• *Table 9: Record of earthquake-induced mass movements on the western slope of Morro de Arica.*
SOURCE: MANAGEMENT AND PROTECTION CHINCHORRO SITES PLAN.UTA.

- **Desembocadura de Camarones Component**

The main processes recorded in this component correspond to soil slides and small rock slides that have occurred constantly on the slopes of the area known as Acantilado Sur (South Cliff) (Figure 58). Runout distances of this type of processes extend tens of meters, although in some cases they exceed 100 m. In addition, in the same sector numerous rock fall events have occurred, affecting the route toward the fishing cove, exactly as it happened during the earthquake on April 1, 2014²³.

On the northern flank of Terraza Sur (South Terrace) there are records of runouts of less than 10 m that are generated due to the steep slopes of its escarpment and its low grade of consolidation (Figure 59).



• *Figure 58: Soil slides affecting the road between the fishing cove and the Camarones Valley.*
SOURCE: Fock, A. Y Urresty, C. Geología y Peligros Geológicos de Caleta Camarones. S.l.: Estudio Plan de Manejo Parque Ambiental Desembocadura de Camarones, 2011



- *Figure 59: Landslides on the slope of Terraza Sur.*
SOURCE: Fock, A. Y Urresty, C. Geología y Peligros Geológicos de Caleta Camarones. S.l.: Estudio Plan de Manejo Parque Ambiental Desembocadura de Camarones, 20112.b.II.iv.Floods



- **Faldeo Norte del Morro de Arica Component**

In this component there are no records of terrestrial floods that affect the Property nor its buffer zone, for the nearest watercourse is the San José River and the component is located outside this river's area of influence.

- **Desembocadura de Camarones Component**

Despite the scarce to null precipitation recorded in the area, the Camarones River has a permanent regime due to its origin in the Altiplanic zone, where the amount of precipitation is greater, reaching over 300 mm. This means also that the discharge of the river increases in the summer caused by high Andean storms²⁴.

Although there are no historical records of floods for this component, the hydrological regime previously mentioned and the presence of deposits and terraces of fluvial-alluvial origin attributable to the Pleistocene and Holocene (see Geology section in chapter 2a), are evidence that floods have occurred constantly during the last millennia associated to the flooding of the Camarones River.

These floods associated to the Camarones River can have as area of influence, in addition to the active course and its floodplains, the inferior terraces that span sectors with elevations under 3 m above the current riverbed¹⁷. Considering the former, the Chinchorro archaeological sites that make up this component are located outside the area affected by these phenomena.

Tsunami Inundation

As is explained in the section referring to seismicity (Table 7), the area of the Property has been affected by several earthquakes of great magnitude that have generated tsunamis. Historical records associated to these events has been documented in works by Lockridge²⁵, Monge and Mendoza¹³, and Ortiz et al²⁶.

Based on this information, it is known that the city of Arica has been affected by several tsunamis along its history. In 1604 there are records of a tsunami that flooded and destroyed a greater part of the city, in addition to causing the death of 34 people.

Another important event occurred in 1868, which affected the cities of Iquique and Arica, reaching a run-up of 12 and 15 meters respectively. This tsunami caused the destruction of an important area of the city of Arica, in addition to causing the death of thousands of people.

On May 10, 1877 a tsunami occurred that affected Arica and Iquique causing the death of nearly 300 and 30 people respectively. This event flooded a greater part of these cities and reached a run-up of 20 meters in Arica and 6 meters in Iquique.

The tsunami from 2014 in the city of Arica was small (<250 m maximum horizontal intrusion) and with a maximum run-up of 2,5 m. It is considered an event of low destruction and short period of residence²⁶.

It is important to note that the Faldeo Norte del Morro de Arica Component is located on a slope, at elevations higher than 35 m a.s.l., so it has not been affected by historical tsunamis.

In the case of the Desembocadura de Camarones component, although no historical records directly refer to this area, its geographic configuration as a coastal wetland and mouth of a river makes this zone highly susceptible to tsunamis. However, the archaeological sites of this component are located at elevations higher than 25 m a.s.l., therefore, they lie outside the area that has been historically affected by these processes. The susceptible zones correspond the active course of the river, its floodplain and part of the lower terraces¹⁷.

2.b.iii. History and Development of Settlement

The Arica and Parinacota region are in the most arid desert in the world. This region spans from the arid coasts of the Pacific Ocean to the Andes Mountains, where we find fertile coastal and foothill valleys. The diverse ecological floors or environments of the region are a testimony to the capacity of men and women who have been able, throughout 11,000 years of human occupation, to conquer this territory. The region 's geographical location in a tri-border area is privileged where adverse environmental conditions can turn into cultural and natural capitals, with a rich heritage derived from the diversity of cultural identities that converge there and the natural landscape that has remained relatively stable through the passage of time.

Owing to the extreme conditions of aridity of the environment and the mineral salts that exist in the subsoil in the territory of Arica and Parinacota, it is possible to find material evidence that bears witness to a diverse cultural heritage that spans from the first hunters in the high Andes, in the Hakenasa archaeological site, at about 4000 meters of altitude, until our time. There are diverse cultural, material and immaterial manifestation that invite us to discover a singular and ancestral territory located in the driest desert in the world, which displays and conserves testimonies from the diverse periods of regional history.

The diverse peoples that inhabited the desert of northernmost Chile encompass an extensive cultural history based on the exploitation of marine resources of extraordinary variety and abundance, in one of the most arid coasts in the world. The availability of freshwater is reduced to small springs that emerge near the sea or in at best in coastal valleys and ravines that cross the desert from the Andes. In the mountain habitats, on the contrary, under less arid conditions, Andean peoples of hunter-gatherer, farming and pastoral traditions settled there. These peoples managed to "domesticate" the desert of northern Chile, leaving a valuable legacy full of conquests and vicissitudes, the plot of which we are just beginning to discover and value in its most relevant details, because of the multidisciplinary research being done in the recently.

The history of the region, reconstructed through archaeological work, shows a progressive improvement in living conditions measured in the amount and variety of objects created for different uses and made with diverse materials that nature had to offer, such as stones, shells, bones, ceramic, skins, vegetable fiber, wool, feathers, remarkably well conserved in the desert sands. Based on these technological tools that allowed them to adapt to these adverse environments, in addition to the functional value of these objects, the existence of complex, although unknown, thought and belief systems can be deduced, expressed in the rich, varied and colorful iconography displayed in pieces of ceramic, textiles, wood, as well as in petroglyphs, geoglyphs and pictographs present in the diverse environments and ecological floors within this territory.

The first settlers established themselves in the area 11,000 years ago as Andean hunter-gatherers in higher altitude environments, or as marine hunter-gatherers in coastal environments. Two great traditions developed from these first migrations: the "High-Andean tradition" and the "Coastal-Andean tradition," that together gave rise to millenary peoples and cultures of the desert of northern Chile.

In the lowlands the "Andean-coastal tradition" managed to establish more stable and permanent ways of life given the wealth of the sea. The development of specialized strategies for fishing, marine hunting and gathering began in older epochs. For fishing, for example, they used nets made from reed and cotton fibers, hooks made from bones, shells, cactus spines and finally copper. For marine hunting, especially sea lions, they used harpoons with stone carved points and bone barbs, while the gathering of mollusks was carried out with the help of an animal rib bone where one end was used as a handle and the other worn down to dislodge gastropod mollusks, like Chilean abalone and limpets, from the rocks.

This Andean-coastal tradition is situated in a phase known as the Archaic Period, which spans from the ninth to the third millennium before present. In the coastal zone, this period is characterized by an economy and form of production centered around hunting-fishing and gathering of marine products. The most relevant cultural component was the complex mummification technique known as Chinchorro.

The Chinchorro coastal populations have a long occupational history in the Arica and Parinacota region forming a tradition of marine hunter-gatherers with records in occupations dating back to nearly 8970 BP in the Acha-2^{1,2} site.

The localities of Arica and Camarones, up until today, is where the greatest intensity of occupation by Chinchorro groups has been verified, in the form of a large number and density of archaeological sites and bodies with artificial treatment, with these areas being representative of this culture. It has been established that this society of fishermen developed between Ilo in southern Peru down to the Antofagasta region in northern Chile.

Based on the research by Hans Niemeyer and Virgilio Schiapacasse ³ in the Camarones Valley, 82 km south of Arica, there is evidence of an extensive temporality of the Chinchorro culture and human bodies with complex

treatment. In the Camarones 14 site, human vestiges with artificial treatment, like those recorded at Faldeo Norte del Morro de Arica⁴, dating back to 7000 BP were recovered, becoming the oldest evidence of artificial mummification for this culture, in South America and the world.

In terms of the research trajectory on Chinchorro societies, it has been different in Arica and Camarones. In Arica, urban and industrial growth triggered the identification of Chinchorro archaeological sites because of their fortuitous exposure during construction and installation of infrastructure^{5,6}. Not only were archaeological remains of the Chinchorro culture found but also from other periods of the pre-Columbian epoch that survive in contiguous areas, showing the extensive and uninterrupted human occupation of this territory. They are for the most part fortuitous finds, triggering the systematic archaeological intervention in the form of rescue and emergency archaeology since the beginning of the 1960s, for there are testimonies of unexpected finds since the second half of the 19th century, taken on in some cases as research projects and currently as part of the environmental impact assessment system. This system aims to protect and conserve archaeological heritage that could be affected by different types of programs or projects. Worth mentioning is the intervention by the staff of Arica's former regional museum and their subsequent work at Universidad de Tarapacá, in the San Miguel de Azapa Archaeological Museum^{4,8,9}.

The mouth of the Camarones River boasts is a different development of the research on its Chinchorro archaeological sites, for which studies have been done, owing to research initiatives initiated at the end of the 1950s that continue to this day, where different motivations and research questions have existed looking to reveal the presence of an intense occupation of the territory.



• *Figure 60: Camarones 8, investigations in archaic floor.*
SOURCE: PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

Component 01: Faldeo Norte del Morro de Arica

Human settlement of the territory where the current city of Arica is located possesses records that date back to ca. 8970 years ago by marine hunter-gatherer groups that left vestiges like the Acha-2 camp site, located at the confluence of the San José or Azapa and Acha rivers.

Most of the findings in this sector were due to unexpected or fortuitous finds that have been unearthed product of urban expansion, the improvement of infrastructure, basic utilities like drinking water and sewers, as well as consequence of urban renovation or urban revitalization. It is a fact that the current urban layout of the city of Arica, its urban structure and its diverse components, were placed on top of old pre-Columbian settlements that with the passage of time have emerged from the subsoil because of the modernization or urban development of the city.

The city of Arica from the Lluta Valley to the foothills of El Morro, including the coastline to the south until Cuevas de Anzota displays intense human occupation approximately 9500 years old. Archaeological sites from diverse periods of the pre-Columbian and colonial eras can also be found there.

The foot of Morro de Arica is located in an area known as Arica's "old city center," an area that reflects occupations of pre-Columbian origin but also those of a colonial character in a second stage of founding and structuring of the city, that due to the ravages of nature between 1604 and 1615, when two great earthquakes destroyed the city that was built near the mouth of the Azapa or San José River, known as *chimba*, the decision was made to move the city to a safer area at the foot of Morro de Arica. This coexistence between the pre-Columbian and the colonial occupation in the city's center continues to this day. In Arica's "old city center" there is evidence of the intense and uninterrupted human occupation which is summarized below.

Historical review for Component 01

- **Early Intermediate or Formative Period**

In the lowlands, a group of fishermen remained settled on the coast, specializing in marine practices while a coastal group ventured inland into the valleys; the plant resources, along with a series of cultural changes, especially technological, stimulated an initial or experimental agricultural stage. Gradually the sedentary nature of agricultural societies shifted the location of the settlement from the coast to the fertile valleys. In the Formative Period two great moments have been identified; the first, more related to the fishermen tradition, called Early Formative (1000 - 500 BC) and the second moment or Late Formative (500 BC - AD 500), linked to contributions of groups from the circum-lacustrine Altiplanic or Circumtiticaca area. The Alto Ramírez cultural phase and tumuli or burial mounds are the best examples associated to this phase.

In Reserves 1 and 2 of Faldeos del Morro it is possible to find evidence from this period, as well as in the quadrant defined by several streets: Yungay from the south, San Marcos from the north, General Lagos from the west and Blanco Encalada from the east.

- **Middle Period**

While local farmers, heirs of the ancient fishermen tradition, used western valleys, near Lake Titicaca and in other zones of the Altiplano human settlements of great social and political complexity emerged. The most significant of these settlements was the Tiwanaku state (AD 500 - 1000), whose influence reached lower valleys as well as the western and eastern slopes of the Andes.

Thus, during the Middle Period, two cultural traditions coexisted in the Azapa Valley, the cultural tradition from the western valleys exemplified in the ceramic styles known as Mayta-Chiribaya and the Altiplanic tradition exemplified in the Cabuza and Tiwanaku styles. These human groups occupied the coastal area of the city.

- **Late Intermediate Period**

After the collapse of the Tiwanaku state, some local groups that had been under their sphere of influence strove for regional preeminence. This epoch is known as Regional Development (AD 1000 - 1470). In the western valleys, the cultural groups would have had a social organization, which would correspond to a society of ranks which were organized in clans or lineages.

One of the characteristics of this period is the continues and intensive interaction established by the societies of western valleys with the Altiplanic societies, especially in the foothills of the Andes in Arica where is possible to observe the interwoven relationship between both social groups. This area is characterized by numerous *pucarás* or fortifications, the remnants of which persist in our territory. In the old town center, evidence of this period has also been found due to urban renovation works and the replacement of sewer lines and water mains.

- **Late Period**

Finally, from half of the 15th century, in an extensive zone in the Andes, including the Arica and Parinacota region, the Inca presence is felt. In terms of the type of domination exerted by the Inca in the area, two possibilities have been suggested: indirect control of the western slope of the Andes through Altiplanic populations with local gentlemen from the circum-lacustrine region, or direct control by the Inca state and their own administrators. Regardless of the alternative that the Inca administration used to annex the territories of northern Chile, it is noteworthy that just as in previous periods, during the Late Period in the current region of Arica and Parinacota, local populations were closely linked to the cultural development of neighboring areas, in this case the development and expansion of the Tawantinsuyu. It should be explained that this region was part of the Collasuyu (southern territory or zone). Evidence in the city of Arica from this period is found in sectors bordering the southern coast and the Azapa and Lluta valleys.

It is possible to document, describe and explain human occupations of pre-Columbian origin owing to the diverse evidence of artifacts and material culture that has been rescued through archaeological, ethnohistorical and anthropological studies developed by researchers. The characteristics of our environment, a saline soil and extreme environmental aridity has allowed finding and learning the use of different natural resources exploited by men and women.

Archaeological evidence found in the region shows the intense use of its different environments. Some natural resources were exploited directly from the environment, other were obtained through work and human inventiveness, and others, on the contrary, were exchanged with other populations from other latitudes of the continent. Today this is still observable through different objects and artifacts exhibited in the museums.

The continuity and change in the consumption and use of these natural resources bears witness to the different stages of pre-Columbian human occupation of this territory. These resources were part of numerous and complex cultural manifestations like textiles, food, hunting, fishing and gathering instruments, animal husbandry, agriculture, ceramic, dwellings, among others. Some of these manifestations disappeared and other remain until today. However, in each of these expectations we can find a world view or a way of looking at life of these pre-Hispanic populations that preceded us in the use and life of this environment.

- **Old city center and Spanish settlements:**

We have already indicated that the actual urban grid of the city in the old town center of Arica dates back to colonial times, but that due to successive earthquakes that have destroyed the evidence of the Spanish colonial occupation, only very few buildings that reflect this occupation remain, among them are the ruins of the San Juan de Dios convent, where the municipal building is currently located and the others we know of through the oral accounts of chroniclers, travelers and historians that tell the story of Arica.

The evolution of our land was further configured with the arrival of the first Spaniards to the area of Arica, which relates to the expedition of Diego de Almagro. One of the first to arrive was Ruy Díaz H., who travels by land from Chincha (Peru), and later embarks in Arica on the "San Pedro" boat toward the central region of Chile, which is said to have happened around 1536. However, according the founding documents, the city was founded on April 25, 1541 by Lucas Martínez Vegaso as a *villa* (town) of the Viceroyalty of Peru, this being the day that the catholic calendar of saints commemorates Saint Mark the Evangelist. This site answered also to strategic reasons of the location of the embarkment and disembarkment of products on the coastal border. This founding document is being scrutinized for historical accuracy to prove its veracity or be permanently dismissed. However, the former is an objective fact that the city has Saint Mark the Evangelist as patron saint, whose name day is April 25.

In 1570 and owing to the embarkment of silver from Potosí, the Spanish crown (under the reign of Philip II) bestows the town the title of Royal City, henceforth called "the Very Illustrious and Royal City of San Marcos de Arica," displaying on its coat of arms Cerro Rico de Potosí. There is a colonial document that certifies its origin known as the "Coat of Arms of Arica."

- **Mummies, grave looting and the market of cultural property:**

During the colonial epoch, pre-Columbian tombs present in the Andes were considered by the Spanish Crown as a source of wealth due to the great number of objects made from precious metals found inside them. This is reflected in the remittances sent to Spain from South America during the 16th century, which contained treasures extracted mainly from *Huacas* (shrines). The Spanish's vested interest in this activity motivated the creation of "Compañías o Sociedades de Huacas" in Perú, companies dedicated exclusively to the looting of tombs.

At the end of the 17th century, mariners who sailed the coast of Arica already recognized the small port by its pre-Columbian cemeteries. Chronicles of the period, like that of the American naval surgeon, William S.W

Ruschenberger, confirm the presence of an established market in the city of Arica for archaeological goods. Information reported by researchers of the period indicates that parts of these collections were sent to the United States, which were later donated to private entities for their subsequent study there. This dynamic continued throughout the 19th century influenced strongly by European colonialism and the scientific development of the period. News of the discovery of mummies in cemeteries near Morro de Arica abound in seminars that took place in the United Kingdom and the United States, in which a detailed description of newly arrived records from South America was given. These records confirm that the looting of archaeological heritage during this period in Arica was constant, intensive and of great magnitude, negatively impacting the area's archaeological sites.

- **Old town center and Peruvian Period:**

After the emancipation from Spain, Arica became part of the Peruvian state, although without the administrative attributions it had boasted in the past, because, due to its loyalty to the royal cause during the war of independence, the city had to cede to Tacna the position of capital of the Department of Arica.

Due to its location, Arica was a strategic point as a port for the Hispanic administration, fundamental for the traffic of mercury to the silver mines in Potosí and the transport of silver from Cerro Rico in Potosí to the port of Arica (Alto Peru - currently Bolivia). Noteworthy anecdotes of Arica's colonial epoch are the incursion of pirates in the area, the configuration of small *haciendas* (estates) implementing the cultivation of olive trees, cotton, sugarcane and vineyards, the religious indoctrination of natives of the area and the incorporation of black population to the history of Arica or how they are still present today with the Afrodescendants. Notable is the participation of the indigenous communities in the rebellion of Tupac Amaru, in the locality of Codpa where Don Diego Felipe Cañipa, who did not betray his Christian faith in 1781, dies for not supporting the indigenous rebellion.

In 1821, the old Viceroyalty of Peru becomes independent, and our region as a part of this territory becomes a part of the nascent Republic of Peru. The city of Arica begins to develop. Among the buildings of the colonial epoch that we inherited worth highlighting are the Basilica Matriz, built by Señor Baltazar Farfallares, the convents San Juan de Dios of the Brothers Hospitallers and San Francisco of the Franciscans. Among the republican buildings, a remarkable example is the old customs building with 21 arches designed by the E.T. Bellhouse & Co company from Manchester, England. This building was destroyed on August 13, 1868 by an earthquake and tsunami that took place in the region.

Subsequently, the railway was built connecting Arica and Tacna, inaugurated January 1, 1857.

- **Earthquakes and tsunamis in Arica and Parinacota region**

17th Century.

During the year 1600, the first earthquake of the 17th century was reported. Then, on November 24, 1604 a new earthquake is recorded that includes a tsunami. The catastrophe destroyed a greater part of Arica, the church, minor buildings and the city's fort. In 1615 the Viceroy Marquis of Mancera gives orders to repair the fort in Arica, however, on September 16, 1615 a new earthquake is recorded 15 minutes long, that destroys the church and the city's main buildings.

The second half of the 17th century is characterized by the reconstruction of a large part of the city and the foundation of important buildings, like Iglesia Matriz (main church). Unfortunately, in 1668 a new earthquake occurs that destroys Iglesia Matriz and the city's school.

19th Century.

History remembers for the occurrence of three strong earthquakes that tragically marked its population. Earthquakes of marked intensity were registered in 1831 and 1832. However, the most important event occurred August 14, 1868 when the city was still under Peruvian sovereignty. The earthquake was 8,6 magnitude on the Richter scale. As a result, almost six hundred people died, of which 212 were sailors that were on ships in the bay, while the remainder 385 people lived in the city. Arica had 40 thousand inhabitants at the time. After the earthquake, a tsunami came destroying most of the city and rendering port infrastructure useless.

The 1868 earthquake and tsunami destroyed all buildings in the city, thus it was necessary to rebuild them. Some of these buildings exist today, like Casa de la cultura (former customs office) or Catedral San Marcos. It must be noted that these buildings resisted the ravages of a new earthquake accompanied by a tsunami in 1877 that, according to historical tales, was not as materially destructive as the one in 1868. Almost a decade later, on May 10, 1877, the region was once again hit by an earthquake and associated tsunami. It is estimated that the magnitude was $M = 8.7$. Considering the reported damages, in addition to the tsunami, it is estimated that to have had a depth of 10 kilometers. Regarding material damage and human casualties, 5 dead and the

partial destruction, although important, of the city were recorded. The tsunami arrived at Arica's coast an hour after the earthquake with 20-meter-high waves (Figure 61).



• *Figure 61: Effects of the 1868 earthquake in the city of Arica.*
SOURCE: MEMORIACHILENA.CL

- **War of the Pacific / Plebiscite / Chilenization of the territory:**

On April 1879 Chile declared war on Bolivia and Peru, this port was the scene of the naval combat of Arica and the battle of Arica, known also as the Assault and Capture of Morro de Arica, on June 7, 1880. At present, on the top of El Morro there is a museum and monuments that remember the War of the Pacific and the battle and capture of Morro de Arica by Chilean troops on June 7, 1880. Several people that participated in this occurrence stand out: General Pedro Lagos, and José San Martín and on the Peruvian side the mythical Alfonso Ugarte and Colonel Francisco Bolognesi. Each year on June 7 this feat is commemorated, becoming a day of festivities for the city of Arica's.

After the Treaty of Ancón, the city passed formally to the Chilean administration, establishing that in 10 years a plebiscite was to decide its nationality, along with Tacna's. This plebiscite did not take place and finally, the Treaty of Lima was signed in 1929 through which the Ministries of Foreign Affairs from Peru and Chile set limits between both nations determining Chile would keep the department of Arica in Chile.

- **The expansion of the city of Arica:**

During the first half of the 20th century, the city began its expansion toward the northern sector, maintaining its direct relationship with the coastline by building a seaside promenade, "La Rambla," and a private beach - in "Los baños" de Bellavista sector, where the port is currently located. The expansion naturally defines the northern urban limit through the San José River Basin.

In the 1960s, access from the urban center to the coastline was limited due to the construction of the port, thus, the ocean-city relationship is diminished. The city continues its expansion to the north, much further than the San José River, making use of the plateau that forms between Cerro Cuño and Chinchorro beach. New neighborhoods emerge, and the residential character of these new neighborhoods is consolidated. The expansion of the city gives rise to today's Cardenal Raúl Silva Henríquez township, main point of growth in the last years. Chinchorro beach begins to shape into an urban coastline and an area of recreation for the city, in general, and the new neighborhoods in the area.

It is worth mentioning that on the high terrace known as "Maestranza Chinchorro," where the Arica-La Paz railway station is located, sites have been found that are associated to Chinchorro societies.

Characteristics of the houses in the old city center. A greater part of the residences are smaller homes. The

construction characteristics of these houses bear witness to transformations that have occurred in the old city center. In terms of materials, for example, there are still houses made of adobe bricks, canes and straw, with a *mojinete* roof (truncated gable roof) and walls of *quincha* (wattle and daub) as signature architecture of the city of Arica, its coastal valleys like Azapa and Lluta, and in southern Peru, in Tacna and its surrounding areas. From an urban development perspective, the residential surroundings of the Property show deterioration in their architecture and there are no holistic plans in the pipeline to rescue the old city center. As has occurred in most of the historical centers in the country, houses have been abandoned, either due to natural events (earthquakes) or to the real estate market's pressure on the plots of land. The conversion of use of properties is a relevant factor in the loss of historical buildings. Incongruous buildings and the destruction/tearing down of houses to set up parking lots is observed. In 2016 the Revitalization of Neighborhoods and Heritage Infrastructure Program began, financed through a loan from the IDB and with funds from the Chilean state. There were five municipalities that benefited from this initiative. The city of Arica's "old city center" is part of the program, which will signify improvements from an urban standpoint and the revitalization of the area based on the heritage elements that comprise it.

- **Junta de Adelanto de Arica:**

In 1958, President Carlos Ibáñez del Campo created the *Junta de Adelanto* (Advancement Board), a unique case in Chile in terms of the autonomy of their decision-making. The Junta de Adelanto drove urban renovation of Arica and incorporated the Altiplanic zones. In 1964 the Industrial Neighborhood was created, with car assembly plants and electronic industries for the Latin American market depending on the exemptions stipulated by the Latin American Free Trade Association (LAFTA). The population grew along with the new infrastructure, a noteworthy example is the great park in front of the Municipal Casino with Caribbean royal palms (*Roystonea oleracea*) brought from Brazil, from where it gets its name "Brazil Park." The improvement of port and airport infrastructure, the stadium, hotel infrastructure and the Universidad de Tarapacá are some examples of this stage of development and modernization.

Arica's urban expansion is produced in this stage of the city's modernization, with the creation of residential and industrial zones, the building of schools and neighborhoods, and a better urban connectivity in the city.

During the 1960s the transformation of Morro de Arica occurs, from its morphology which changes due to the extraction of rocks used for the expansion of the port of Arica and the connection of Alacrán Island to the continent.

Connecting Alacrán Island to the coast: Separated by a canal 460 m wide (Alacrán Peninsula (NM)) from the coast, it was a guano deposit until 1967. On this island have been found the remains of fishhooks and harpoons of its first inhabitants, fisher-gatherers of the 1st and 2nd centuries. The island was subsequently fortified by the Spanish, artillery was used to repel the continuous attacks by privateers and pirates like Drake, Sharp and Watling, attracted by the shipments of gold and silver from "Cerro Rico de Potosí" that left from this port to Spain. In 1964 the island was connected to Arica. It currently houses the Arica's Yacht Club and unique waves form around the former island, giving life to water sports like surfing and bodyboarding, which have given rise to national and world competitions. The most famous of these singular waves are "Gringo", "El Buey" and "La Isla."

- **First archaeological finds:**

The research trajectory on Chinchorro societies has been different in the localities of Arica and Camarones. In Arica, urban and industrial growth generated the identification of Chinchorro archaeological sites because of their fortuitous exposure during the construction and the installation of public infrastructure ^{5,6}.

These archaeological finds have therefore been for the most part fortuitous, bringing about activities of rescue and emergency archaeology since the 1960s, taken on in some instances as research projects. In this task the work done by staff of Arica's former Regional Museum and their subsequent work at Universidad de Tarapacá, in the San Miguel de Azapa Archaeological Museum is notable.

- **Urban growth:**

On the northern slope of El Morro, urban growth occurs at the end of the 19th century with houses built with wattle and daub or *quincha* in its walls and of adobe. Some of the archaeological sites become known to researchers thanks to the discoveries made during the building of public infrastructure and the remodeling of houses and to a lesser extent product of programmed research. The 20th century begins with a period of territorial dispute between Peru and Chile over the situation of the cities of Arica and Tacna. During this time improvements in infrastructure and utility services of the city were carried out, among which is the installation of streetlights and potable water tanks and sewage reserve areas in 1920. These potable water tanks were installed on Faldeos del Morro, resulting in the remarkable revelation of mummified bodies during construction work. Decades later, the remodeling of Mirador La Virgen (2008), a viewpoint, was also a

relevant find. This last construction work and the corresponding archaeological rescues were regulated under the protection and conservation of the Law of Monuments 17.288.

Today the bodies rescued in both instances are housed in San Miguel de Azapa Archaeological Museum, of the Universidad de Tarapacá. Many of them led to the creation of Sala Chinchorro, an exhibition unit dedicated to the conservation and valorization of the heritage of Chinchorro societies in our region. This building was erected between 2006 and 2009 and inaugurated in 2010.

The following sites, which have been studied, can be found on Faldeos del Morro (slopes of El Morro), many of them discovered owing to unexpected or fortuitous circumstances. (See Sheet N°9)

Morro-1 Site

From this area, known commonly as Estanques, proceeds part of the “Aborígenes de Arica” collection, where the German archaeologist Max Uhle¹⁰⁻¹² excavated nearly one hundred individuals during the second decade of the 20th century, proposing the first typology of bodies with artificial treatment in the history of research, also describing a group of artifacts and cultural elements he found associated to the bodies. Max Uhle called them “mummies of complex preparation.”

Additional information on the Estanques area is provided by the Swedish botanist Carl Skottsberg who visited Arica in May 1917 and rescued a few bundled mummies with masks and wigs. The bundle contained two infants with similar mummification procedures, which are now deposited in Världskulturmuseet, Goteborg, Sweden 4,8,9. Furthermore, Munizaga and Martínez 13 described an *estólica* (atlatl or spear-thrower) and a clay figurine found also in the Estanques area.

In December 1983, the archaeologists Guillermo Focacci and Vivien Standen carry out, in the same area, a rescue excavation inside the installations of the company that supplied the city of Arica with drinking water at the time. The first bodies rescued by this team from San Miguel de Azapa Museum correspond to a multiple burial composed of 7 mummies (Black Style Mummies/Modeled).

From this moment on, Guillermo Focacci, who at the time was director of the Anthropology Institute of Universidad de Tarapacá, took charge of the first stage of rescue of the remaining bodies that had been identified. His work allowed the rescue of 60 complete and incomplete individuals. Subsequently, between January and March 1984, Vivien Standen took over the excavations, recovering another 73 complete and incomplete individuals.

Rescue work (Figure 62 and 63) resulted in nearly 140 bodies, in addition to a group of incomplete remains collected on the surface and in the fill material of the site. Human evidence was found at different depths, from 30 cm to more than 100 cm, in an area of 14 m by 12 m. Of the 134 records, 37 bodies had complex treatment. In general, the bodies were inhumed forming multiple burials and configuring archeological funerary sites.



• Figure 62: Morro 1, Archeological rescue.
SOURCE: MARVIN ALLISON. PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.



• Figure 63: Morro Site 1.
SOURCE: MARVIN ALLISON. PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

- **Morro 1/5 Site**

This archaeological site was excavated in the context of an archaeological rescue led by Guillermo Focacci in 1985 due to the remodeling of Mirador La Virgen, located on the western area of the northern slope of Morro de Arica, where Colón Street comes to an end. The site is composed of a collective inhumation with 16 red mummies and one natural mummy. The rescued bodies were, in general, found in good conditions of preservation.

In terms of the excavation context, the sand stratus associated to the bodies was damp and maintained a depth of finding of between 30 to 80 cm. It is currently possible to distinguish on the surface of the site fragments of mollusks, lithic reduction material and exposed stratigraphic profiles characteristic of domestic settlements.

- **Morro 1/6 Site**

This site was discovered in 1987, in the area neighboring to the water tanks, when the plot was being leveled to build a game court 14. San Miguel de Azapa Archaeological Museum of Universidad de Tarapacá was informed of the finding of human osseous remains and intervened the site (Figure 64).

This site corresponds to the continuation of the Morro-1 site, in an area of 5 m by 12 m, where 62 bodies, without complex preparation or any artificial treatment and only preserved in their natural condition were recorded. These findings correspond to complete and incomplete bodies and a small number are disturbed remains, which were deposited directly below the sand sediments of the hillside at an average depth of between 20 and 100 cm.



- *Figure 64: Morro Site 1-6.*

SOURCE: PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

- **Mirador la Virgen Site**

Among the most characteristic sociocultural expressions of the city's population as well as that of those who live in the Faldeos del Morro area are customs and valorizations linked to Mirador de la Virgen (a viewpoint). This place becomes an important local religious space, where two ceremonies take place of great importance to the city's Catholic population. Both ceremonies are linked to the religious festivities of the Virgen del Carmen.

The viewpoint was built circa 1915, however, testimonies indicate that greeting and farewell celebrations in honor of the effigy of the Virgin by religious dancers are performed since approximately the 1970s.

After the initial work done by Guillermo Focacci in this area in 1985, in May 2008, due to the new remodeling of the area, Calogero Santoro, Vivien Standen and Bernardo Arriaza performed the archaeological rescue of 14 individuals, of which two infants had complex treatment (Red Mummies).

The bodies were concentrated in the western sector of Plataforma 1 (12 bodies) and the two remaining bodies were in the east sector of Plataforma 2 (highly stirred and disturbed bodies). The bodies were wrapped in twined mats, bird skins with ochre pigments and/or camelid skins. They had clothing (*faldellín* or fringed skirt and loincloths) and mortuary offerings. Among the associated contexts, a knife with handle, net bags, grass brushes were also found.

Presently, eight bodies are maintained in situ on the site, which are protected by a wooden shed. The remaining bodies had to be removed due to profile collapse and moved to San Miguel de Azapa Archaeological Museum. In 2011, strangers entered the area where the bodies were kept in situ and altered part of the bioanthropological vestiges and their contexts. As a result of this intrusion, a new structure was built that protects the bodies to this day. This space is acknowledged by Arica's citizens as a space that houses remains of Chinchorro societies.

- **Colón 10 Site**

This archaeological site was discovered in May 2004 product of construction work carried out inside a house located in number 10 Colón Street. After notice of the find was given, the site was studied by Vivien Standen and Calogero Santoro between 2004 and 2010.

An intensive excavation plan was initiated to rid the site of archaeological material and thus allow the private endeavor, the building of a hotel, to continue. During a few days it became evident that it was a cemetery that extended through most of the property.

However, the fragility and vulnerability of the bioanthropological remains made their removal and subsequent transfer to San Miguel de Azapa Museum impossible, so the decision was made to keep the bodies in situ. Archaeological excavations revealed 48 bodies that were left exposed between 2004 and 2005, and from that date onward have been conserved in their same place of burial.

Thus, in 2006, Universidad de Tarapacá buys the property from the private owner and with the support of the regional government of Arica and Parinacota the project "*Habilitación sector de emplazamiento, Museo de sitio Colón 10*" (set up of Colón 10 Site Museum) is executed with mixed financing, US \$ 257.575 supplied by the National Fund for Regional Development (FNDR) and US \$98.480 supplied by Universidad de Tarapacá. The archaeological rescue and set up of the existing house as a site museum begin thereafter. The construction of 441.3 m² included structural reinforcement and the building of a terrace of 91.3 m² as scenic viewpoint. Colón 10 Site Museum exists since 2009, managed by Universidad de Tarapacá. This cultural space gives us insight into their habitat and cemetery, highlighting the life of and the use of their surroundings by these coastal populations that lived in this area 4000 years ago.

Component 002: Desembocadura de Camarones

Historical review for Component 02

Geographically this sector of the river mouth corresponds to a rural area linked historically to the Hacienda Cuya, property that was partly divided into 5 lots (A, B, C, D, E) by the Agrarian Reform in the 1970s. The plots of land were acquired by Agrícola Camarones Limitada, transferred subsequently to Agrícola Tarapacá Limitada in 2006. Its current owner is Agrícola Lluta Limitada, according to property records (fojas 3943 N° 3221) of the Registro del Conservador de Bienes Raíces of Arica (Recorder of Deeds) from 2013.

The boundaries of this property and its relation to Caleta Camarones and other archaeological sites of the southern terrace have legal disputes, indirectly, since the end of the 1990s. First, there was a civil trial over a vindication lawsuit, Rol N°60.274 at the Primer Juzgado de Letras (lower court) of Arica, where the lawsuit was rejected for it was not the State Treasury nor the Municipality of Camarones the material owners or occupants of the settlement known as Caleta Camarones. Then, during 2013 a trial (Rol N°C-1110-2013) began before the Primer Juzgado de Letras en lo Civil of Arica between Tarapacá Limitada and the State Treasury where the ownership of the public road called A-306 route was discussed. However, the final ruling came from the Supreme Court on March 15, 2016, declaring that the road is national property of public use, without discussing or determining the extension or boundaries of Agrícola de Tarapacá's property. Claims of private ownership over land where the fishermen settlement is located and the Terraza Sur sector were left as an unresolved judicial issue, notwithstanding that the State Treasury maintains these plots belong to the State whose ownership is protected under global inscriptions under the State's name (fojas 25 vuelta N° 60) in Registro de Propiedad del Conservador de Bienes Raíces (Recorder of Deeds) of Arica from 1935 and the reinscription of possession (fojas 78 N° 77) in Registro de Propiedad del Conservador de Bienes Raíces (Recorder of Deeds) of Pozo Almonte from 1985.

Regarding archaeological investigations in Component:

- **Camarones 1 and Camarones 2 Sites**

Both sites have been scarcely reviewed¹⁰ and were excavated by archaeologists Virgilio Schiappacasse and Hans Niemeyer during 1978, 1979 and 1980. There is no information on its stratigraphic behavior or its context. The integrity of the archaeological site has been hardly affected and since 1980 has not been newly researched.

- **Camarones 14 and Camarones 17 Sites**

These names respond to a dispersion continuum of materials and correspond to the same archaeological site. Camarones-14 was initially found due to the study of sites of the period of Inca influence at the mouth of the Camarones River. On the surface, ceramic fragmentation contemporary to Inca domination was recognized. To characterize the site test pits were dug that revealed an underlying preceramic occupation, in part stirred by the late agro-ceramic settlement⁵. The research done on this site was described in detail in a published monograph. Camarones-17 was excavated by Aufderheide and collaborators⁵ covering¹² m².¹⁵

Currently, the Camarones-14 site is only a short distance from a group of houses in use, in the area known as Caleta de Camarones¹⁶.

- **Camarones 8 Site**

This archaeological site has the same characteristics of Camarones-17 and is located approximately 500 m east of it. The archaeological work was also done by the team from Universidad de Tarapacá, integrated by Arthur Aufderheide, Iván Muñoz and Bernardo Arriaza, where 10 m² were excavated in a first stage. Subsequently, ⁶ new square trenches were excavated to define the habitational pattern that appear based on the strata ⁵.

- **Conchal Sur Site**

The archaeological excavations of this shell midden, published by Mario Rivera¹⁷, were carried out from 1979 by researchers from Universidad del Norte (Antofagasta) and Universidad de Chile (Arica). There are no scientific publications or reports about its contexts and material culture.

- **Camarones-15 Site**

Circa 1974 begins the archaeological research in this site, Sector E 18, led by the archaeologists Guillermo Focacci and Mario Rivera who worked with members of the Anthropology Department of Universidad del Norte, in Arica. In 1988, Mario Rivera excavated Sector D of the current site that was in direct relation to Sector C (Figure 65).

Within the project "Estudios arqueológicos en la desembocadura del río Camarones" (Archaeological studies in the mouth of the Camarones River), financed by Universidad de Tarapacá through the Dirección de Investigación y Desarrollo Científico (Board of Research and Scientific Development), a team comprised of Iván Muñoz, Raúl Rocha and Sergio Chacón excavates Sectors A, B and C of the Camarones-15 site, whose materials and contexts were published 20. The dense shell midden corresponding to Sector A was worked following an exposed profile 2 m high²¹.

The integrity of the archaeological site has been affected mainly using the former Route A-376, which is now called Route A-306, and its length was reduced to 10 kilometers. The other 4 kilometers have been are managed by the Municipality of Camarones to allow fishermen access to the pier located on the southern terrace of the mouth of the Camarones River. Despite this measure, currently the site has great potential, as evidenced by exposed profiles that reflect floor shell middens that surpass four meters in depth.



- *Figure 65: Camarones 15, archaic floor, south profile.*

SOURCE: PHOTOGRAPHIC FUND, DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ.

Recent actions in the settlement:

- **Irregular Human Settlement**

At the onset of the nineteen nineties and as a result of a decision taken by the then Provincial Governor of Arica, Luis Gutiérrez Torres, a group of fishermen and their families who had remained in the sector of the jetty at Caleta de Camarones were forced to move to the south terrace at the mouth of the River Camarones for safety reasons, because the alarm had been sounded of the possibility of an earthquake and tsunami in the north of Chile and south of Peru. This was in addition to the fact that where the fishermen had been living happened to be an area of mass slides

Because of this relocation, the firm of Ariztía, through AGRICOLA TARAPACA LIMITADA DE “AGRÍCOLA CAMARONES LIMITADA”, the owner of the land, filed suit against the Municipality of Camarones. In that suit, the Supreme Court dismissed the accusation because the suit should have been filed against each one of the squatters at the time.

The municipal administration at the time took steps with public institutions and with the support of the population to improve their lifestyles and negotiate relocation outside the buffer zone of the Property.

The settlement has 30 homes and, according to the 2017 Census, in Caleta Camarones there are 86 residents. The data was not broken down per family or gender during this census, but the neighbors reported there were 36 families in the settlement (Figure 66 and 67).

Regarding social organizations, those present in Caleta Camarones are as follows:

- 1.- Community Club N° 15 of Caleta Camarones
- 2.- Social, cultural and sports center of “Heirs of the Chinchorro Culture”.
- 3.- Trade Union of Independent workers of shell-fishermen and similar divers’ assistants at Caleta Camarones.
- 4.- Union of artisanal fishermen and similar at Caleta Camarones.



• *Figure 66 Aereal view Caleta Camarones.*
SOURCE: CRESPO, M. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.



• Figure 67: Panoramic view of caleta Camarones.
SOURCE: CRESPO, M. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

Construction of new roads

- **Camarones 15 Site, slope of Acantilado Sur**

A road for vehicular access to the fishing wharf was built at the beginning of the 1980s, which meant cutting lengthwise across the slope where the habitational camp and cemetery of Chinchorro societies is located, this has caused instability and the risk of a landslide, in addition to the consequent exposure of the bodies. Although the intervention is irreversible, it can be mitigated by reducing vehicular traffic on the road to avoid the vibration of deposits and decrease the risk of damage. Mitigation actions have been established, access will only be granted to residents that have sea-related jobs.

Intrusion of foreign elements to the site:

- **Camarones - 14**

In 2017, the Municipality of Camarones intervened the surface of the archaeological site to build a scenic viewpoint. However, realizing the impact this construction work could mean, the Municipality stopped the work and promised to remove all superimposed elements (sacks of sand). In addition, the archaeological excavation that remains open was enclosed with a provisional fence made from wooden posts.

- **Poultry Farms:**

In the component's buffer zone there are poultry farms belonging to a private company, a secondary road network and parallel to the main roads.

- **Wharf:**

In 2014, the old fishers' wharf is replaced by new port infrastructure.

Future challenges

Further study of the Chinchorro archaeological collections of the Property will be a contribution to the analysis and interpretation of subjects and themes still pending and to new theoretical proposals and multidisciplinary perspectives that allow contributing to the transmission of the OUV to future generations.

Substantial advances have been achieved in diverse areas of the anthropological study of the Chinchorro groups. Considering this synthesis, it becomes evident that the Property has an extraordinary research potential given its universal value: heritage, scientific, ethnic and symbolic of archaeological sites that remain deposited in situ. Finally, the extended research of the Property should allow reconstructing the occupation history and the cultural, socioeconomic and adaptive processes that took place in this unique territory during five thousand years of occupation by the Chinchorro group's ⁷.

The possibility to answer research questions such as sedentism and mobility at the core of marine hunter-gatherer societies, cultural valuation of infancy, site formation processes, settlement patterns and the use of space, refine the cultural sequence, social interaction between coastal groups, emergence of social differentiation, complexity and transition toward productive economic systems, funerary ideology and post-excavation conservation, among possible others.

Patrimonialization of the Process

This document presents the development of the patrimonialization process of the “Chinchorro Culture” in the neighborhood contiguous to Faldeo Norte del Morro Component of the city of Arica and Desembocadura de Camarones, places that are characterized by the presence within their territory of archaeological sites that have high heritage value and are of great scientific importance. This document describes the social complexities that have presented themselves and how they have given rise to a process of heritage revalorization and rescue through interinstitutional actions, the empowering of local communities and the reconfiguration of their collective identity.

- **Background**

To understand the dynamics of heritage, it is necessary to define what is understood by the concept of patrimonialization. It can be defined as “Process that bestows [the] significance of heritage to an object or social practice through a selection [process], as a way of attributing value for its protection.” It can also be understood as “voluntary process of incorporation of socially constructed values, contained in space-time of a particular society (...) This appropriation and valorization as [a] selective, individual or collective action is expressed in concrete actions that allow building durable identity references.”

At a local level, the valorization process of the Chinchorro culture begins almost at the end of the 20th century, period during which scientific research revealed the cultural and heritage value of the archaeological remains inherited from the Chinchorro hunter-gatherer people, categorizing them as something unique at a global level. This discourse has been reproduced by local public organizations, constituting currently a symbol of regional identity.

Communities that currently reside in the territory inhabited in ancient times by Chinchorro groups have not been left out of this process, those who as years went by have recognized Chinchorro archaeological heritage as part of the collective identity, empowering themselves by it.

Component 01: Faldeo Norte del Morro de Arica

The component of the Faldeo Norte del Morro de Arica is in the center of the city of Arica, precisely inside neighborhood districts N° 20 and N° 30. A total of 285 personas reside inside the buffer zone and this is the principal group of interest regarding heritage awareness and citizen participation. The following social organizations are found in the area:

- Community Club N° 20 “Faldeos del Morro”.
- Community Club N° 30 “7 de junio”.
- Senior Citizen’s Club “Primavera 2000”.

The work carried out together with these organizations has been based on talks and discussions related to world heritage and the impact it will have on the community during the nomination process of the Chinchorro Culture as a Heritage of Humanity (Figure 68).

Moreover, links have been tightened with the school community and the different educational establishments in the municipality of Arica, with talks and workshops, itinerant exhibitions as well as visits to archeological sites.



• *Figure 68: Arica community meeting, July 2018.*

SOURCE: MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

- **Colón 10 Site Museo**

The Colón 10 property is an archaeological site museum belonging to Universidad de Tarapacá that protects vestiges of the Chinchorro Culture inside its premises. Since its inauguration, the relationship between the local community, specially neighbors that live in the area, and Chinchorro cultural heritage has been strengthened, allowing access to knowledge of this culture without having to go to San Miguel de Azapa Archaeological Museum located in the homonymous locality.

In terms of citizen participation throughout the development of the nomination process, during its first stages, meetings with the community in the Faldeo Component were held in several neighborhood councils' community centers located in the intervention area and in the premises of some public institutions, buildings that served temporarily to develop this type of activities. Faced with the necessity to have access to suitable infrastructure for this type of interventions, requests were made with the Anthropology Department of Universidad de Tarapacá to gain access to Colón 10 Site Museum, which has to date served as a meeting place for the local community. In addition to satisfying logistical necessities, this action has contributed to the revalorization of the site museum, familiarizing the area's neighbors with it and strengthening the community's sense of belonging and identity to Chinchorro archaeological heritage through the utilization of this communal space.

- **Archaeological Reserves N°1 and N°2**

The process of heritage revalorization of archaeological reserves N°1 and N°2 was initiated in response to local social demands and needs. During the last ten years the state of neglect of the area enabled the appearance of delinquent acts, causing unease and the increase of social vulnerability, deteriorating the quality of life of neighbors who live near the archaeological site. These delinquent acts stem from an irregular occupation of the area by strangers to this community, whose presence in addition to generating social problems with residents, put the integrity and state of conservation of the archaeological sites at risk.

In light of this situation and through efforts made by Universidad de Tarapacá and the team in charge of the Management and Protection Plan of the Chinchorro Sites, a series of initiatives were brought to fruition in conjunction with the area's neighbors --neighborhood council N°30 called "7 de Junio"-- and local government services to protect the archaeological sites throughout the nomination process through conflict resolution and security measures to reestablish order and improve the living conditions of the people who reside in the area.

Clean-up events were carried out with the participation of teams from the Municipality of Arica, Universidad de Tarapacá and other organized groups of neighbors, who have supported the process of recuperating this space.

This communal work has made greater public support of and participation in the nomination process and Universidad de Tarapacá possible, empowering the community in the territory they inhabit and revalorizing local archaeological heritage.

- **Morro 1 Site - Water Tanks**

Morro-1 archaeological site (water tanks), also located in Component 01, was in conditions of vulnerability like the previous case, albeit with a lower level of complexity, for the archaeological site was abandoned, which brought about the temporary irregular occupation of the structure present on site and an increase in the traffic of people that circulated inside the site. This generated insecurity among neighbors and strong anthropic pressure in the site.

In the dialogue generated with the area's neighbors they showed marked interest in reutilizing the space, looking to eliminate delinquency (insecurity), give the space a new use (community proposals of a social and cultural character) and recuperate the area.

The neighbor's narrative describes the area of the water tanks as having always had archaeological remains, a quotidian part of life of those who have lived there longest. The situation in this neighborhood, where there was previously no consideration towards the care and protection of heritage resources, at a community as well as at an institutional level, has shifted with time through the processes of education and heritage valorization, managing to incorporate this variable into their local identity, adhering favorably to the nomination process.

- **Community Involvement**

One of the main social objectives, through actions of the Management and Protection Plan of the Chinchorro Sites, was to inform, create a dialogue with and include the local community in decision making in the nomination process. Universidad de Tarapacá had previously made the local community aware of the importance of the archaeological heritage present in their territory and the need to conserve and safeguard these sites. In terms of the current program, the main idea is to reinforce the work that was previously done, incorporating new demands and needs to the scope of cultural heritage from a community perspective and to further promote the Outstanding Universal Value of the settlement.

In the last two years a total of seven meetings have been held with the community in Arica, instances in which a total of 79 people have participated. In Annex 3 are verifications of the activities carried out by the program for Component 01. Meetings corresponding to 2018 were mostly held at Colón 10 Site Museum, thus increasing the number of participants from the area. Finally, the first instances of participation were in relation to educational aspects and the promotion of the Chinchorro culture, while further along in the program subjects related to the nomination file and its implication at a community level were discussed. It is worth noting that there is still a total of two scheduled meetings (until October 2018) pending, with the request from the community that these socialization instances become permanent.

The coordinated work between organized civil society, municipal and regional authorities and Universidad de Tarapacá to vacate irregular housing and the removal of material from the site, aiming to legally obtain deed of the fiscal property is therefore noteworthy. Work has been carried out with the neighbors to define basic protection measures necessary for the safeguarding of the Component and national funds have been sourced for these tasks in the order of \$460.000 USD.

Component 02: Desembocadura de Camarones

- **Locality of Caleta Camarones**

The current irregular settlement located in a place called Caleta Camarones is result of the migration of artisanal fishermen from different parts of the country 40 years ago. Since then, the local population has coexisted quodidially with the archaeological vestiges present in the area, witnesses also to the varied archaeological research that has been done in the last decades in the mouth of the Camarones River.

The results of this research highlighted the importance of the Chinchorro culture at an international level, generating scientific and touristic interest from different parts of the world to discover the remains of the oldest artificially mummified bodies of humankind that are found in the mouth of the Camarones River. Faced with the increase in the number of visitors to the area and the risk of maintaining conditions of local archaeological heritage, the residents of Caleta Camarones began performing the role of “guardians” of the place, restricting in some cases people’s access to the archaeological sites to protect and conserve these records. This community’s interest in cultural heritage has gone together with local scientific research and institutional policies that aim to raise awareness of the protection of archaeological records in the area.

At a level of organizations from civil society, the neighborhood council of the locality has been a participant in private and public program offers through training programs and the application to support programs aiming to develop areas of tourism and culture in the zone. In addition, the interest of the local population in the issue of heritage has given room for the emergence of social organizations of a cultural character (social, cultural and sports center of the Chinchorro culture).

We observed that inhabitants of the locality have a general knowledge of Chinchorro themes and part of the history of the Property. The process of patrimonialization of the Chinchorro culture in the population of Caleta Camarones has influenced a change in the opinion and perception of the area’s inhabitants regarding their archaeological heritage, going from being a threat to the valorization of the vestiges found in the area, perceiving it currently as an opportunity for social, economic and cultural development.

- **Citizen Participation**

Like events in the city of Arica, in previous periods (2011), the University of Tarapacá worked with the community of Caleta Camarones with the aim of raising awareness about the protection and conservation of the Component and its environmental context. The incorporation of the community to the nomination process and the implications of the eventual inscription as a World Heritage site, opened the perspective of the community with respect to the current conditions of the component, the need for its protection and in turn activated social demands.

In the same line, the team of the Management and Protection Plan of the Chinchorro Sites managed to incorporate the perception of the community regarding the nomination process and the necessary management of the Component. In this way, it was incorporated into the planning for the management of the Property, where the priority lines of projects that the community prioritized. In relation to the instances of participation of the community in the nomination process, since 2017 a total of 8 meetings have been held with the community of Caleta Camarones, attended by 95 residents of the locality. In Annexes 3 and 28, some of the activities carried out are verified.

Much of the meetings held in a first stage with the neighbors of Caleta Camarones were in relation to the dissemination of the Chinchorro culture and the Component OUV. In a second stage, issues of protection,

conservation and implications that the eventual inscription of the Good as a World Heritage Site were reviewed (Figure 69).

In the calendar of community activities of the Chinchorro Site Management Plan Program, there are still pending work to be done, two meetings with the neighbors of Caleta Camarones, which will demand a greater number of instances of participation once the implementation and operation of the Corporation that will administer the Property begins.

Currently, the Municipality of Camarones, the Regional Government and residents of the irregular settlement are in a process of dialogue and negotiation regarding the relocation of the houses. For what is foreseen soon, to achieve the relocation of the settlement in the outer limit of the buffer zone of the Component, what would allow to reestablish the original conditions of the sector of the plateau. See Anex 3: Documents of the Patrimonialization Process



• *Figure 69: Caleta Camarones community meeting, may 2017.*
SOURCE: MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

- **Other Communities**

In addition to the resident population near the nominated sites in the file, the Management and Protection Plan of Chinchorro Sites has developed activities to promote and raise awareness with students from different educational establishments of the city of Arica. Among these activities there is an itinerant exhibition of replicas of Chinchorro tools and mummies that circulates temporarily through schools and public buildings. Additionally, Presentations have been held at schools, there have been guided visits to the museum and trainings, especially in science fairs and commemoration days, like Cultural Heritage Day, with more than 3800 people in total in attendance (Figure 70).



• *Figure 70: Arica Students visiting museum Colón 10.*
SOURCE: CECREA. CREATION CENTER ARICA. MINISTRY OF CULTURE, ARTS AND HERITAGE. 2018.



3





JUSTIFICATION FOR INSCRIPTION



3. JUSTIFICATION FOR INSCRIPTION

3.1. Justification

3.1.a. A brief synthesis

Considering all the archeological evidence in the region and the different visions of the researchers regarding the hunter-gatherer-fishermen called the Chinchorro and the Property, they are found contextualized within a broad range of time that went from 7420 AP until approximately 2840 AP. However, it is worth mentioning that it was in the Valley of the Camarones (Camarones Site 14), around about 7000 AP when artificial mummification arose, which was a unique and exceptional feature of the Chinchorro.

So, the presence, development and disappearance of these cultural groups, including their polychromatic mortuary practices varies for a few centuries depending on the region studied and the focus of the study. Therefore, the Chinchorro groups, during the archaic period and responding to a process of adaptation of the group of hunter-gatherers to their arid surroundings, occupied the gullies, coasts and wetlands – all associated with the mouths of the rivers – to the far north of the Atacama Desert in Chile.

The Chinchorro groups were able to achieve a successful human adaptation to extremely arid surroundings, capitalizing on specific environmental conditions in the area, making use of the abundance of resources along the coast as a result of the marine diversity generated by the influence of the Humboldt current as well as the availability of water around the limited local sources of this resource, such as streams and tiny rivers that flowed down to the sea permanently. These environmental conditions enabled the Chinchorro groups to establish permanent camps along the coast and in a gradual process of early sedentarism based on their exploitation of the coastal resources.

This pattern of settlement is not characteristic of hunter-gatherer groups, but rather typically of societies producers of food. But the Chinchorro – based on a fishing, hunting and gathering economy which is normally associated with a pattern of residence with permanent mobility - broke this traditional scheme and developed around 7000 AP, a complex system of coastal subsistence whilst permanently exploiting resources from the sea and the salty wetlands.

The theory that Chinchorro groups settled permanently in certain enclaves leads to the problem of the archeological paradigm prevalent for marine hunter-gatherers all over the world: it begs the question as to the social aggregation of bands as a social structure and it adds a query as to high mobility as a fundamental part of the marine hunter-gatherers and it also questions agriculture as a determining element of early sedentarism.

Records of this human group include a series of archeological sites in which are preserved, to a large extent, environmental, technological, mortuary and spiritual attributes that make up the identity and uniqueness of the Chinchorro Culture. The lifestyle of the Chinchorro extended over a territory that covered the Far North of Chile and the South of Peru where most of the archeological sites linked to the Chinchorro culture tradition are found along a coastal floor, or at least only a few kilometers from the coast. However, the best evidence is found in the north of Chile, specifically within a territory that runs from Arica to Punta Patillo and which includes in that extension the river valleys of Lluta, Azapa, Vitor, Camarones and Camiña (See Sheet 18).

The Chinchorro used a specialized technology when exploiting the marine resources that enabled them to use different kinds of tools prepared using mostly local resources such as vegetable fibers and wood obtained from the cattails and reeds in the local wetlands, shells and bones from mammals, shellfish, fish and marine birds they hunted as well as the leather obtained from those same animals. But they also incorporated other resources such as lithic, skins and fibers from cameloids obtained from further inland ¹⁻².

Likewise, they dominated the surrounding area in the sense that they possessed an exhaustive knowledge about the resources available, the land and routes over it, and this enabled them to deploy their adaptive skills. Those resources they were unable to find along the coast were brought into their economy by fanning out over the highest lands of the interior valleys where they made use of seasonal camps. During their occupation by the Chinchorro of the Atacama Desert, the technological changes observed over time point to an intensification in the use of the resources about their subsistence ¹⁻³.

On a more spiritual and ideological level, the Chinchorro developed a deep-seated connection with their dead and this gave rise to historically unprecedented manifestations worldwide with the application of techniques they used when preparing bodies post-mortem which arose around 7000 AP. They developed artificial mummification procedures that gave rise to a varied range of styles^{2,4-7}. These forms of expression associated with their funerary practices had to be based, ideologically, on a complex system of beliefs and specialization that enabled them to maintain it over thousands of years.

Artificial mummification by the Chinchorro is a surprising element because of its complexity and artistic beauty^{3,8}. In practice, mummification was carried out using the same tools, materials and resources they had at hand for their daily subsistence when tackling a human problem so universal as the death of the members of the community. The funeral and domestic spaces were close together on the inside of the camps of these marine hunter-gatherers and the deployment of their adaptive strategy whilst interacting between the living and dead over a prolonged period would give rise to a landscape that was characteristically Chinchorro in these territories.

The artificial mummification of the Chinchorro reveals styles defined with colors, shapes and characteristic materials which required complex anatomic interventions, together with the presence of specialists from among the populace⁹. This enabled them to construct modeled bodies for the deceased members of the group that ritually continued forming part of their daily lives. Spiritually, they thought up complex mortuary manifestations – the oldest in the world – including historically unprecedented artificial mummification procedures. These funereal practices are of an artistic and spiritual nature because they express all the Chinchorro beliefs; their perception of life and death.

Of the whole of the vast territory where Chinchorro groups were present, two components were selected from the Settlement zone that complied with the following criteria:

1. That the territory be found inside an absolute and/or relative period of dates and the spatiality of the Chinchorro settlement.
2. That the territory contains the attributes defined for the Property: bodies artificially mummified and/or a Chinchorro context based on scientific research.
3. That the site be in a state of conservation of its attributes that enables its outstanding universal value to be comprehended.
4. That there exist in the territory a body or a group of persons who could be relied upon to protect, manage and handle the component.

Prominent among this territorial occupation, because of the conditions of authenticity and integrity as well as the conservation of the attributes, are the components on the Faldeo Norte del Morro de Arica and at the Desembocadura de Camarones as being the most representative of the Chinchorro settlement. Therefore, the Property to be nominated is a serialized site made up of the two components mentioned.

The Faldeo Norte del Morro de Arica and the Desembocadura de Camarones as components of the serialized Property called the *Settlement and Artificial Mummification of the Chinchorro Culture* consists of areas of dense deposits of middens, residential and burial sites that are closely related to each other; conserving below the ground a unique testimony that conveys the technological and spiritual complexity reached by this society of marine hunter-gatherers, covering a variety of their cultural expressions; from their coastal beginnings (ca. 7400 AP) until their disappearance (ca. 2840 AP).

The components belonging to the Property; i.e. the Faldeo Norte del Morro de Arica and the Desembocadura de Camarones stand as the nucleus of the Chinchorro cultural tradition because they contain deposits and natural areas of high significance as a representative testimony to the habitat and the spaces of daily relations of the Chinchorro groups, of their areas of recollection (shell fish, fibers and vegetables), fishing and hunting (on both sea and land) as well as where they stayed overnight, prepared their food and cultivated their bonds with their dead.

Within an environmental context privileged by the mouths of rivers and maintaining a social organization of marine hunter-gatherers, their cosmovision gave rise to a scenario that was uniquely Chinchorro and which involved the living as well as the dead in their recurring use of the same spaces over generations. The human and material remains associated with the components of the Property provide evidence of such practices as the domestic and ritual subsistence deployed by the Chinchorro over approximately four millennia in these territories.

The Property's attributes

- The environmental context of the mouth and ravines of the rivers
- Archeological deposits and stratigraphy in situ which reveal the dynamics of occupation of the space over time.
- Archeological sites: Cemeteries and domestic sites.

In the case of Component 01, Morro 1 is found on the Coastal Cordillera that flanks the south-west side of the city of Arica as the largest Chinchorro cemetery excavated and which has provided a large amount of archeological evidence as well as the largest amount of mummified bodies. This cemetery has been the source of numerous studies, prominent among which are those that have enabled the current types of mummification to be defined. The Properties and the Chinchorro mortuary pattern can also be found in other neighboring areas of the Faldeos on this hill, such as Morro 1/5 and Morro 1/6. The case of the site of the Colón 10 Museum, adjacent to the Morro 1 site is the only interpretive space where an extensive cemetery can be found *in situ* with evidence of extensive bodies resting *dorsal decubitus*. In the case of component 02, the Desembocadura de Camarones, the site of Camarones 14 contains evidence of an extensive temporary occupation of the sector and where the funeral and domestic area overlap each other, besides providing the earliest dates of Chinchorro artificial mummification; i.e. 7000 AP ²⁻³. A little further south and along the coast, although still in the same area, is Camarones 15 which also contains evidence of these marine hunter-gatherers from the Archaic and where progressive social adaptation can also be observed, into which new cultural features from within the region have been incorporated.
- Human bodies, treated and untreated

The Chinchorro cemeteries reveal bodies naturally mummified; i.e., because of the environment and artificial or human mummification. The latter is unique and of an outstanding universal value because of its complexity, age and aesthetics ⁸. The Chinchorro innovated continuously in their primitive practices of artificial mummification, revealing an astonishing technical ability and early perfectionism of complex mortuary practices that meant systematically dismembering bodies and reassembling them to create artificial mummies that possessed extraordinary material, sculptural and aesthetic qualities that reflected the fundamental social role of the dead in human society.
- Artifacts. They had a series of tools and implements which were simple but effective and which enabled them to make intensive use of local resources.

3.1.b Criteria under which the inscription is proposed (and justification for inscription under these criteria)

The Settlement and artificial mummification of the Chinchorro Culture complies with criterion (iii): To provide a unique, or at least exceptional testimony of the cultural tradition or a civilization, alive or dead, as a result of which, some 8000 years ago, the first groups of hunter-gatherers living along the northern coast of the Atacama Desert and which we now know as the Chinchorro Culture, adapted a pattern of settlement in privileged habitats – mouths of rivers and ravines along the coast – within a context of extreme aridness. Out of a dominance of their surroundings and the sustainability of permanently establishing themselves in the territory, a sense of belonging and rootedness arose as well as a complex ideology and spirituality that led them to live alongside their deceased, thus giving origin to the Chinchorro Settlement.

This cosmovision led them to develop a practice of artificial mummification, considered the oldest in the history of Humanity, of a noticeable complexity for such groups of fishermen, marine hunters and gatherers. The important remains left behind by the Chinchorro stand as a testimony to their system of beliefs and ideas regarding the afterlife along the coast of the far north of Chile; one of the most arid in the world.

3.1.c Statement of Integrity

A declaration of integrity

The archeological settlement found on the components of the Faldeo Norte del Morro de Arica (in the city of Arica) and at the Desembocadura de Camarones (Camarones Valley), some 100 kms from each other, constitute a representative and exceptional series as nuclei of the Chinchorro Culture. The uniqueness of these components, which complement each other, lies inasmuch that, along the North Coast of Chile can be found, individually, the largest amount and diversity of archeological sites and attributes representing the Chinchorro culture and which have lain untouched for over 7000 years up to today.

Both individually as well as a whole, the degree of integrity of these two components guarantees their permanence in situ of all the attributes necessary for providing the relevant and fundamental information when it comes to understanding the Property and the delimitations of the nucleus and buffer zone that will enable the adverse effects of development to be kept under control. The integrity of the environmental and archeological contexts stands as a testimony to the outstanding relationship between the lifestyle of a marine hunter-gatherer society and their vision of the afterlife during one of the most arid regions of the planet.

Located along slopes and on terraced levels, the archeological settlement of the Chinchorro of the Morro de Arica and the Desembocadura de Camarones conserve extensive areas of archeological deposits and they preserve the attributes that make up a documentary body and evidence of the lifestyle of these human groups and their exceptional funereal art which grants them their outstanding universal value.

Justification

Component 01 – The presence of the Morro de Arica and an extensive alluvial plain associated with the rivers San and Lluta constitute the environmental context that has been maintained with a configuration similar over time since the beginnings of the Chinchorro occupation. Due to the urban nature of the territory, not all the elements can be included within this environmental context inside the area of the property to be nominated, but from some of the sites of the component it is possible to behold a panoramic view over the city which enables the series of elements making up the environment inhabited by the Chinchorro to be admired. Nevertheless, this sector has been historically intervened by urban sprawl which has meant modifying the surroundings (Figures 71 - 75). Despite this though, the environmental context continues to be identifiable and can be contemplated by the community; studied and understood by means of geomorphological and paleo-environmental studies.

Component 02- What is relevant is that the geological and geomorphological information available for the area of the Desembocadura de Camarones indicates that, although active geological processes have been recorded as soil slides and alluvial processes associated with the River Camarones, there have been no drastic changes in its general geomorphological configuration during the Holocene (the last 11,000 years). This means that the principal geomorphological features of the component (the river valley, terraces and bed of the river as well as its banks) have a general configuration like that which existed during the Chinchorro occupation. This allows the environmental context to be observed nowadays in which the settlement developed and understand the original way the Chinchorro related to their surroundings and habitat in the territory.

The archeological sites researched in each one of the components are representative of the habitat and daily spaces used - camp, cemeteries and middens, among others. The archeological deposits and stratigraphy that remain in situ are evidence of that. They are receptacles of human and archeological remains that include bodies with and without any artificial mummification as well as different types of artifacts in daily and/or ritual use -for example, hunting tools, gathering and fishing, clothing, decorations and funereal offerings-.



• *Figure 71: Archeological site of Conchal Sur, located in the sector of the South Cliff, Desembocadura de Camarones.*
 SOURCE: CASANOVA, P. 2017

At present, both the settlement, as well as all the evidence of artifacts that remain in situ below the surface, maintain their integrity as a potential source of scientific information for the present and the future. So, in the domestic sites, such as Conchal Sur, Camarones 14, Camarones 17, Camarones 1, Camarones 2 and Camarones 8 the possibility is assured of future studies into the relations that the populations had with each other and with their surroundings; besides getting to know their lifestyle, technology, subsistence and settlement. On the other hand, the bodies, household furnishing and offerings that were placed next to the deceased in cemeteries such as Morro 1, Morro 1/5, Morro 1/6, Mirador La Virgen and Colón 10, on the Faldeos Norte del Morro de Arica and at Camarones 15 at the Mouth of the Camarones, enable us to explore the material context and its symbolic dimension within the mortuary ritual.

The integrity of the sites and the material and human remains found over extensive areas of stratigraphic deposits as well as the contexts that make their interpretation possible, is assured over time due to the conservation of the attributes of both components at their original location. This is where the aridity of the desert aids the conservation of the evidence in the same conditions in which they were originally deposited.

In addition to this, the techniques and methods used in the archeological excavations and salvage operations have considered conservation action before and after, guaranteeing scientifically controlled conditions. At present, regarding the components of the Property, priority has been given to implementing a conservation model on site, whilst the material rescued has been kept safe in the corresponding institutions; mainly the Museum of the University of Tarapacá of San Miguel de Azapa located in the city of Arica.



• *Figure 72: Deposits of Chinchorro mummies, Museum of the University of Tarapacá San Miguel de Azapa.*
 SOURCE: CHOW, C., 2017. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

Comparatively speaking, the states of conservation of the Faldeo Norte del Morro de Arica and the Desembocadura de Camarones are different. The former is in an urban area and the latter in a rural one and, therefore, the sources of pressure and its effects on each component are dissimilar.

Although the integrity of the archeological settlement covers most of the extension of both components, it is acknowledged that, associated with human pressure, some fenced off sectors have found themselves affected superficially. Nonetheless, these changes are barely significant because they do not directly affect the archeological deposits underneath and measures have been taken by fencing off the components as well as putting into practice legal protection measures for heritage with a series of rules and regulations of a territorial nature to guarantee the Property is properly protected.

The component Faldeo Norte del Morro de Arica is in an area where urban sprawl in general poses a constant source of pressure over the Property and its surroundings.

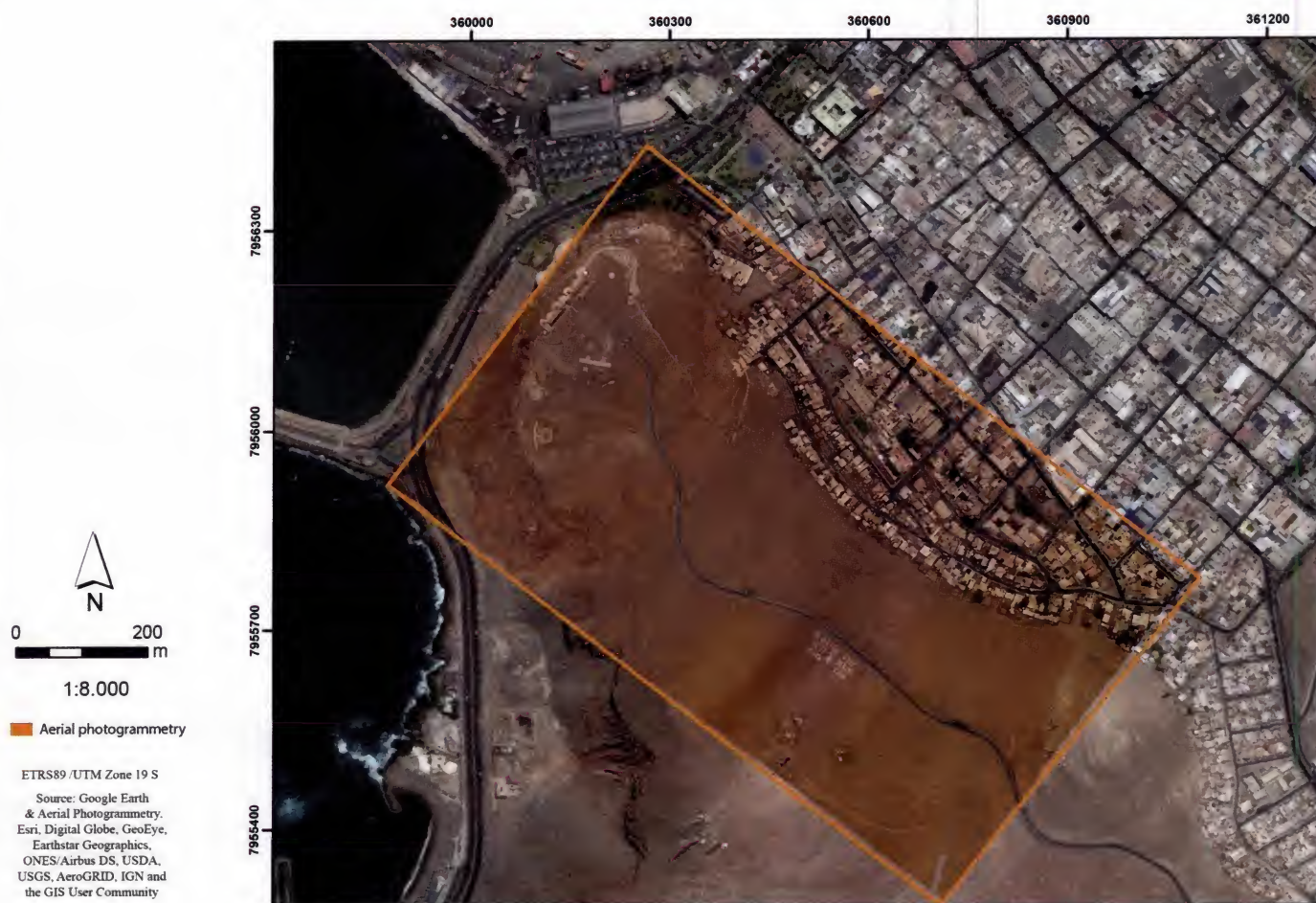


- Figure 73: Panoramic view of the urban development in the city of Arica in 1910. The Faldeo Norte del Morro de Arica shows scant human intervention.
SOURCE: GISMONDI



- Figure 74: Panoramic view of the urban development in the city of Arica in 2018.
SOURCE: CASANOVA, P. 2018

AERIAL PHOTOGRAMMETRY IN FALDEOS DEL MORRO COMPONENT (001): MORRO DE ARICA



- *Figure 75. Aerial photogrammetry of the Faldeo Norte del Morro de Arica in Arica.*
SOURCE: CRESPO, M. 2017. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

In view of the discovery of this pressure, the sector around the Faldeo Norte del Morro de Arica has been safeguarded for decades now by means of archeological salvage operations on the spot of those bodies exposed as well as prospections and systematic archeological records, whilst there has also been a definition of the areas of Archeological Reserves N° 1 and 2. Reserve N° 1 houses the Morro 1/5 site whilst Reserve N° 2 remains untouched. At present, the University of Tarapacá holds a gratuitous concession over most of the component, thus guaranteeing its future conservation and protection.

The component Desembocadura de Camarones is in a rural area where the archeological sites are conserved within a geographic space characteristically associated with the Chinchorro: an esplanade within a coastal area bordering the Coastal Cordillera, with a sector of flora and fauna of wetlands, prominent among which is the area of the mouth associated with the presence of a regular course of water from the River Camarones. In this component, interventions have been recorded in the surroundings because of human activities of the industrial productive type (poultry farming) and handicrafts (fishing). In that sense then, rural development also assumes that a threat to the Property will exist, albeit to a lesser degree than the previously mentioned component, due to its relative isolation.

This component stands out because of the excellent conservation of extensive areas of archeological deposits, prominent among which are the middens of monumental sizes and highly visible, with fully preserved mortuary contexts below the surface. The whole of this body of material evidence contains relevant information for understanding the domestic and funereal aspects of these groups of marine hunter-gatherers.

What is most remarkable is the role played by the museums of the University of Tarapacá in the tasks of safeguarding, conserving and disseminating this heritage; for example, in the cases of the Archeological Museum of San Miguel de Azapa and the Museum at the Colón 10 site. In the case of the Museum of San Miguel de Azapa, just like the large deposit, human and material remains have been salvaged from the archeological sites located on the Faldeo Norte del Morro de Arica, and it has assessed the degree of stability of each piece and defined the materials that make up the Museum's permanent exhibition, whilst others are stored in its deposits under strict environmental control (Annex 2). In the case of the Museum at Colón 10 site (Figure 76), this museographic space enables the cosmovision of the Chinchorro to be observed and interpreted in situ.



• Figure 76: Museum of Colón 10 Site, a historic center in the city of Arica.
SOURCE: CHOW, C. 2018. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

Most of the human and cultural remains have been salvaged because of the archeological excavations of the Component of the Desembocadura de Camarones and they are now being taken care of in the National Museum of Natural History in the city of Santiago, Chile.

On the Faldeo Norte del Morro de Arica; i.e. on the hillside facing north, lies the cemetery which is the most important recorded collection representative of the Chinchorro funerary tradition. In addition to this, the Desembocadura de Camarones is characterized by conserving the characteristics of the environmental context in which the Chinchorro occupation developed because it maintains in place extensive areas of archeological deposits. The latter contain relevant information for understanding the domestic and funereal aspects of these groups of marine hunter-gatherers and the relations they established with their surroundings.

See Annex 4: Publication of: Catalog of Chinchorro Mummies, Bodies with artificial mummification. Archeological Museum of the University of Tarapacá, Arica (B. Arriaza y & V. Standen 2009).

See Annex 5: Publication: "Conservation & prevention of a unique collection in the world: the Chinchorro Mummified Bodies". (Santos, M. 2002).

3.1.d. Statement of Authenticity

Declaration of Authenticity

The authenticity of the settlement of the Chinchorro Culture is vouched for because of the presentation of the attributes presently defined, such as: the environmental context, the presence of archeological sites, stratigraphic deposits as well as the artifacts and human remain deposited in an area around the Faldeo Norte del Morro de Arica and at the Desembocadura de Camarones. When dealing with a settlement, the expression of its attributes and values depends to a large degree on the process of interpretation of the remains found and a study of their habitat. In that sense then, immersed in the desert climate present in the region, the components of the Property have been preserved in good condition, especially those attributes that are below the surface because they remained preserved in their original state; albeit with the differences already mentioned about the state of the environmental contexts regarding each one of the components.

The components of the Property, Faldeo Norte del Morro as well as the Desembocadura de Camarones exhibit a varied and extensive range of sources of information of a scientific, historic, archeological, bio-anthropological, geological, environmental and regulatory nature that enables a clear and complete picture to be established regarding the attributes and values of the Property. This is backed up by an important pile of archeological and bio-anthropological evidence studied over a century of research which has enabled a knowledge of the nature, specificity, significance and history of this cultural heritage to be learned.

The research carried out around the archeological sites of the Components – be they domestic or mortuary – and the human and material remains that make up both components, have generated a significant amount of information on their associations, functions and contexts. This research includes specialized analyses as well as radiocarbon dating processes that have enabled us to understand the sequence over time of the Chinchorro cultural tradition on a broad scale; covering the development and variability of their cultural expression; from their beginnings (ca. 7400 AP), and until their disappearance (ca. 2840 AP) ^{4, 8, 10}.

The Settlement of the Chinchorro Culture has been researched scientifically for almost a century, starting with the first excavations by Uhle in 1919. Although during the first few decades research was more sporadic, knowledge of the Chinchorro cultural tradition has developed systematically since the consolidation of local institutions. First, since the end of the nineteen fifties when the Regional Museum was created, and which paved the way for the present Regional Museum of San Miguel de Azapa; then, with the work carried out under the auspices of the University of Tarapacá, including the progressive incorporation of research, many of them still active specialists. What is known about the Chinchorro, such as studies of their archeological sites, has been endorsed in a series of national and international scientific conferences and publications ¹⁻¹¹. This scientific production – consisting of more than a hundred publications – guarantees the authenticity of the contexts studied and this document is based on the data, contents and interpretations of the archeological and bio-anthropological evidence found therein.

The job of conservation in the museums has led to remains being preserved that had been dug for study, with a view to enabling them to be interpreted in the future by the public in general and by researchers. The Museum at Colón 10 Site has given priority to the conservation of these attributes in view of the risks of transferring the bodies to the museum. Although a large part of the mummified bodies have been salvaged from their burial sites, the institutions responsible for them have complied with the job of conserving the structural, ornamental and

chromatic attributes of the bodies artificially mummified; especially expressed in those bodies with a complex mummification.

About the artifacts that belonged to the Chinchorro, they were made with products obtained from their surroundings, such as the flora (matting, reeds, and cacti), fauna (birds, mollusks, fish, seals and cameloids) as well as minerals present in the region and which can still be found. These are fragile elements exposed to deterioration once dug up from the ground and which are best conserved in the conditions in which they were buried. The job of conservation in situ and in museums has maintained the attributes in such a state that they that retell the creative use by these early settlers of the limited resources in the surrounding desert.

All told, the use and functions of the attributes making up the Settlement enable the lifestyle of the Chinchorro as marine hunter-gatherers, to be interpreted, revealing a pattern of stable residence and visible permanence by observing their funereal and domestic contexts that are conserved in their original places of deposit. The archeological sites researched in each Component have enabled their use and functions to be made known, thus exhibiting a recreation of their funereal and domestic contexts in local museums for a better comprehension of their significances and values.

The present location of the Components of the Property is the same as that occupied over several millennia by the Chinchorro. Here as where they established their camps and cemeteries; the remains that were deposited in them still visible. The surroundings have modified about the component, Faldeos del Morro, now a part of the urban landscape of Arica, although the panoramic view still exists from the sites over the coastal esplanade. At the Desembocadura de Camarones the main environmental conditions remain intact and which characterize the surroundings of the Chinchorro during their original occupation. Because we are dealing with a rural area barely populated; it is here that we can fully admire the elements that contributed toward the environmental context in which the settlement developed.

The components of the Property amount to an archeological site and stratigraphic deposits that stand as a unique testimony to the development of the Chinchorro cultural tradition and they are representative of their exceptional and outstanding traditional practices, such as artificial mummification. These deposits testify to the spaces occupied by the Chinchorro groups (along the Coast of the Atacama Desert) and they provide an account of their use in a diversity of material and human remains. They constitute a material and cultural repository of scientific value as they contain bio-anthropological evidence and artifacts that conserve their properties unaltered since their origins, thus allowing the Chinchorro occupations to be placed within a certain timeframe (ca. 7400-2840 AP) and within a social and economic context.

3.1.e. Protection and management requirements

The components of the Property, Settlement and artificial mummification of the Chinchorro Culture are in the 15th Region of Arica and Parinacota in the far north of Chile and they are subject to existing regulations at a national, local and private level applicable to the protection of cultural heritage.

The Property's legal protection system is found in letters a-d of Chapter 5, where mention is made of the legislative development and institutional framework extant in Chile aimed at guaranteeing the protection of all the Property's components. This refers to a multiplicity of legal rules, pertinent at different levels and in diverse areas for the protection of the Settlement of the Chinchorro Culture which includes specific declarations of Historic Monuments for sites and which stem from a willingness to protect cultural heritage that has been unfolding over the last 90 years by the State of Chile. This willingness has been ratified and renewed with the enactment of Act N°21.045 dated November 03, 2017 by means of the creation of the Ministry for Culture, the Arts and Heritage. This is series of regulations that grant a new constitution to the several institutions which, separately and up to now, had shouldered the task of protecting the nation's cultural heritage.

Within the locality, an acknowledgement and special regulations have been coordinated for the polygons of the components and their buffer zones within a legal framework at a municipal level, besides the territorial orders that are still being prepared.

The Management System for the Settlement and Artificial Mummification of the Chinchorro Culture has included in its design the idea of sustainable development, consisting of:

- A framework of prior diagnoses developed as management plans for each component; i.e. one for the Faldeo Norte del Morro de Arica and another for the Desembocadura Camarones.
- The formation of a governance framework through a local administrator which would be a private Corporation.
- The development of plans in the shape of a Management Plan for the property which includes programs and sub-programs within four work areas.

- A portfolio of projects (management actions), a timetable and a budgetary estimate of the start-up and cost of the actions which will enable a road map of commitments to be put together regarding management by the administrator.

The management system proposed has meant that the territorial parties involved get together with the core objective of ensuring sustainable protection, conservation and administration of the Components of the Properties to maintain and transmit the Outstanding Universal value of the Property to future generations.

The challenges posed regarding the implementation of the Management System can be classified into three spheres of activity:

a) Political.

Every four years there must be a change of national/regional administration and, alternately also every four years, there should be changes in the municipal administrations. Because of this, the challenge consists of introducing the governance designed and where society and the operative structure of the Corporation can remain in support of the continuity of the administration and management of the Property. This will allow the operation of the road map for the Property to begin to operate to generate trust and so that the governance can be transferred without let or hindrance during the changes of regional and municipal administration to achieve a convergence of political determination regarding the continuity of the management.

b) Technical

As mentioned in item 5, our country has a great dearth of professionals in heritage, archeological conservation and geotechnics and these are matters that are fundamental for diagnoses and interventions (if necessary) about the components of the Property. To overcome this, training professionals in such areas as archeology, architecture and geology on matters of management and conservation must be strengthened and encouraged to continue with the collaborative work together with international specialists like that conducted at the International Conservation Workshop (Arica, July 2018) as well as carrying out an interdisciplinary and rigorous monitoring of the components of the Property.

c) Management and Administration

As described extensively in item 5.e., the governance of the property will consist of a Corporation (Public-Private) which will have a board and a small technical-administrative team. Managing resources for implementing the portfolio of projects shall be able to rely on an interdisciplinary team able to develop and follow up those tasks and projects that are outsourced.

3.2. Comparative Analysis

3.2.a. Criteria for assessing the value of the cases to be compared.

The Property, consisting of the settlement of the Chinchorro cultural settlement and the archeological sites that stand as evidence of their occupation, are part and parcel of a category called an archeological heritage property ¹.

Comparing the Chinchorro settlement with other archeological remains is based upon their unique attributes and they are those that pnnia, especially oriented toward treating infants.

3.2.b. Research into the Chinchorro cultural tradition: background regarding the comparisons made.

During the scientific research into the Chinchorro culture, it became necessary to put its material evidence into context; a job that has also considered comparisons with other cultural expressions in South America and also worldwide.

For example, historic reviews have been assembled of groups of fishermen, hunters and marine gatherers from the coastal deserts of the South American Pacific area, ancestors or contemporaneous regarding the occupation by the Chinchorro culture along the coastline of the Atacama Desert. Already by the Middle Archaic period (4450 – 3450 BP), some of these groups appeared to have a sedentary base, managing crops and with a diversity of practices in relation to how they treated their dead ², without ever finding cases of artificial mummification. Sites along the north coast of Ecuador, such as Las Vegas (8250 – 6600 BP) ³⁻⁵ and in Peru at such deposits as Huaca Prieta ⁶, Las Haldas, Culebras, Huarmey, Aspero, Chilca ⁷, Asia ⁸ and Otuma, among others, show some features in common, among which is the presence of their monumental and ceremonial architecture ^{9,10}.

Furthermore, within the framework of the research into the Chinchorro, comparisons have been drawn with mortuary records from other sites such as La Paloma (6950 – 4450 BP) ^{5,11,12}, located to the south of the city of present-day Lima, where funerary groups are found with special care afforded the bodies of young adults.

Even though no remains of artificial post mortem mummification remain, it has been mentioned that

“Paloma revealed burial practices consistent over a long span of time and showed a rather conservative mortuary tradition very much like that of Chinchorro. Among these practices was that of wrapping the bodies and burning them in situ. Also important was the special treatment of infants and the use of red pigment; both features similar to Chinchorro.” ^{5:62}

As a result of the archeological evidence recorded in the Central Andes, it might be suggested that death was a major concern for the Archaic populations, among which the complex treating of the bodies carried out by the Chinchorro cultural tradition is in itself unique ¹³.

Of the artificial mummification carried out by the Chinchorro groups, one of their most outstanding features was, almost four decades ago, compared with similar manifestations in Melanesia ^{5,14}. Particularly, the artificial mummification processes in New Guinea described as being 5000 years more recent than that of the Chinchorro and, despite the 10,000 kms in distance between both locations, it has been proposed as a case of cultural parallelism in which the independent appearance of similar cultural features was probably due to the existence of a common ancestor of both groups ¹⁴. This theory was not taken into consideration subsequently during the archeological discussions.

3.2.c. The Chinchorro Culture. A comparative perspective. The archaeology of the earliest human mummifications.

For the comparative analysis, a specific methodology was developed that enabled the unique and outstanding nature of the Chinchorro culture and its occupation to be compared. This was achieved by means of a collective work in which 11 experts from Chile and abroad took place, representing 7 countries and 10 institutions who, because of their research, debated the uniqueness of the Chinchorro culture at a UNESCO Conference held in Arica, Chile in 2010.

The result of this concerted effort led to the publication by the University of Tarapacá, in cooperation with the National Monuments Council within the framework of the Themed Program of World Heritage and Human Evolution of: Adaptations, Migrations and Social Developments (HEADS) of the UNESCO¹⁵.

This work is an important methodological reference for comparatively studying the Chinchorro Culture because it features cases for study from different parts of the world of archeological deposits left by cultures of hunters, fishermen and gatherers, or communities specialized in consuming marine resources as well as early human mummification processes: the Caral Culture from Peru, the deposits found at Sambaquis in Brazil or the analysis of the funerary traditions of the Neolithic in the Middle East at Tell-Aswad, Syria (Table 10).

SITE	CHARACTERISTICS	TIMETABLE	UNESCO LISTED
Caral	Monumental architecture from the Late Archaic period	3000 – 1800 BP	Listed (in 2009)
Sambaquis	Extensive areas of middens (zeolites, artifacts made from shells and bones & textile technologies)	8500 – 1000 BP	No
Tell-Aswad	First manifestations of body treatments by means of plastering skull	9200 – 8000 BP	No

• Table 10: Summary of the comparative analysis (adapted from Sanz et al. 2014).

Based on the cultural features that make the Chinchorro cultural tradition so unique, granting it an outstanding and singular character, the other cultural manifestations around the world are mentioned. They can be compared to features of Chinchorro settlement and society, prominent among which are the particularities that express the unique and outstanding quality of this cultural tradition:

- 1) Prominent among the societies located along the desert coastal landscape of the South American Pacific are those that occupied the archeological site of Caral. This deposit enables expressions of a social complexity and religiosity within a similar environment to be compared (a coastal desert in association with river courses), and over a similar period (Late Archaic, 4090 – 3640 BP).

Monumental architecture as a religious expression (Caral, Peru) – Artificial mummification as a religious manifestation (Chinchorro, Chile). From a geographic point of view, one of the similarities that exists between the deposits in Caral and the Chinchorro settlement is that both are in a similar environment: a desert environment, very arid and a nearby coast rich in resources thanks to the cold Humboldt current and rivers. However, these natural conditions led to different manners of production: in the case of Caral, an economy that added fishing to agriculture, with the generation of surpluses and the exchange of goods between the coast and the hinterland, and the case of the Chinchorro culture: an economy dependent upon the extraction of marine resources, to which was added game and terrestrial recollection.

The difference is also obvious between the type of occupations and the material culture each cultural group illustrates: the presence of public architecture in Caral consisting of monumental platform mounds and ceremonial plazas, besides residential architecture; all of them standing evidence that is absent in the case of the Chinchorro occupations. Despite this absence of complexity within the sphere of the facilities and architecture, the Chinchorro groups developed sophisticated procedures regarding the artificial mummification of their dead; a feature nonexistent at Caral.

Even considering this significant contrast, both cultural groups can be compared since in both of them there was a social system linked to a high degree of religious ideology:

*"The Chinchorro social system was different to that of Caral; however, the special attention paid to mummifying their dead indicates that their system, also, was probably based on a strong religious ideology, in the same way that religious ideology intervened in the more complex social organization of Caral; the deceased ancestors and relatives, although losing their material existence, remained among the living in their recomposed bodies as components of the group [...]"*¹⁶

Just like the development of the occupations in Caral, at the Property, active cemeteries were found, such as Morro-1, Morro-1/6 (Sub-components of the Faldeo Norte del Morro de Arica) and Camarones-15E, Camarones-2 and Camarones-15D as well as the domestic sites of Camarones Sur (Sub-component Desembocadura de Camarones).

At the Chinchorro deposits previously referred to, there is still evidence of hunting, fishing and marine gathering practices and, to a lesser degree, terrestrial. So, the artificial treatment of their bodies can be observed by means of corporal fillings and superficial treatment of the mummified bodies in a natural way. Likewise, an increase can be observed in the contexts of the funerary artifacts, the presence of distinctive decorations (for example, Camarones-15D) and the presence of crops among the offerings; something that tells us of a growing complexity with social distinctions and a gradual transition toward the production of food.

- 2) The settlement of the Chinchorro cultural tradition is characterized by the existence of stratified deposits that testify to such contexts as fishing, hunting and marine gathering. A similar case is that of the Sambaquis deposits (Brazil) that represents the same lifestyle dependent upon the sea and techno-manufactured articles that are similar about their material qualities.

Middens along the Atlantic coast (Sambaquis, Brazil) – Middens along the Pacific coast (Chinchorro, Chile).

Both deposits reveal material evidence of the same lifestyle and they represent material testimonies of groups of hunters, gatherers and fishermen using specialized an efficient technology in a coastal environment.

The abundant areas of middens in both cases are comparable because they attest to a part of the daily life of the ones living in those South American coastal environments during the dawn of the Holocene Era (8500 BP). Cases such as Camarones-14 (7420 – 6615 BP), Camarones-17 (6930 -6780 BP) and Camarones Conchal Sur (5640 – 3060 BP), in the Sub-component at the Desembocadura de Camarones enable the middens along the western coast of South America to be characterized and compared with similar evidence on the Atlantic coast, such as Sambaquis.

The Sambaquis and Chinchorro deposits share similar technologies, such as artifacts in shells (for example, beads), artifacts made from string or thread, and bone (for example, awls).

Just like with some of the Chinchorro (for example, Camarones-14), the communities producing the middens or Sambaquis deposited their dead inside their homes, combining funerary and domestic activities in the one same place. This is something that reveals an affinity between the living and the dead. However, both cultural groups do not share the same complexity when it comes to treating bodies post mortem. The absence at the Sambaquis middens of any artificial intervention of the bodies of their dead is the substantial difference in their beliefs around the social and spiritual significance of the deceased.

- 3) The early social complexity of the Chinchorro cultural traditions is revealed in the development of their artificial mummification practices that lasted millennia, especially oriented toward the post mortem treatment of their infants. Similar procedures can be observed in the funerary evidence at Tell Aswad.

Plastered skulls (Tell Aswad, Syria) – Artificial Mummification (Chinchorro, Chile). The occupations at Tell Aswad (10,450 – 7450 AP, in the Southern Levant of the Near East) occurred without interruption during the Pre-Pottery Neolithic. This site is part of a neighboring settlement of populations whose social structure was centralized and economically oriented toward farming and herding, as well as hunting and gathering.

Just like in the archeological contexts that mark the Chinchorro settlements with their cultural traditions, the arrangement of the funerary space at Tell Aswad is variable, whilst there are records of burials inside as well as at a distance from areas occupied domestically.

"In Tell Aswad we see a change in funerary practices. When the village was first settled, the dead were buried in the houses themselves, either beneath the floor or in the walls. Sometimes the dead were laid out on the floor and then covered by a little mound of earth to protect them. Everything was done as if all the occupants of the house were still together after death [...]. Towards the end of the period during which the village was settled, we find a twofold change: firstly, the dead are gathered in cemeteries, and, secondly, plastered skulls make their appearance. Both events suggest that the role of the dead in society had increased; now being the concern of a larger circle than just the family" ^{17:180}

Both the settlement of the Pre-Pottery Neolithic period in the Near East as well as along the coastal desert of the South American Pacific, specifically in dispersion of the Chinchorro Culture, sites have been recorded of burials that involved bodily interventions by means of plastering skulls and/or faces.

"The funerary tradition of plastered skulls was not a very widespread custom in the Pre-Pottery Neolithic in the Near East. It was limited in time and is found only at sites dating from between 9200 and 8000 BP" ^{17:178}

When comparing the Property with the settlement in the Southern Levant (for example, the sites at Tell Aswad, Jericho, Ramad, Kfar Hahoresh and Beisamoun), what is noticeable is that the bodily modifications in the Near East only involved treating the skulls. This different from what was observed in Chinchorro where the whole body was submitted to an overall modification. The thoracic, abdominal and pelvic cavities were especially treated, and all the organs and soft tissue were extracted, with the subsequent addition of materials that would restore the body to its original size and with the appearance of physical features. The artificial mummification of the Chinchorro cultural tradition appears to be an exceptional and unique case of early funereal art which positively put a value on infancy when doing so, because almost all the infants belonging to this culture are present.

Despite the aspects that make them different, the funeral practices observed in the Southern Levant settlement as well as those belonging to the Chinchorro cultural tradition are construed as similar cultural activities when faced with death, because both considered post mortem mummification of the human body, using aesthetic qualities and ways in which to express and conceive a significance once life has ended.

3.2.d. Comparative analysis: the settlement and mummification of the Chinchorro cultural tradition within a worldwide context.

Hunters, gatherers and fishermen and their settlement: cases on the World Heritage List of the UNESCO

Establishing a review of the representativeness that the fisher-hunter-gatherer life has within the framework of the World Heritage List is interesting. As a matter of fact, it includes Properties that include occupations and settlements in this group on a broad scale, time wise.

In view of the nominations submitted based on diverse settlements of fishermen-hunter-gatherer groups under criterion iii: “to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living, or which has disappeared”, the result yields a total of 13 Properties, distributed among 12 countries and on 4 continents (Table 11).

PROPERTY	COUNTRY	YEAR LISTED	
Caves of Las Manos, Río Pinturas	Argentina	1999	iii
Serra da Capivara National Park	Brazil	1991	iii
Sites of Human Evolution at Mount Carmel: The Nahal Me'arot / Wadi el-Mughara Caves	Israel	2012	iii, v
Chongoni Rock-Art Area	Malawi	2006	iii, vi
Rock Paintings on the Sierra de San Francisco	Mexico	1993	i, iii
Prehistoric Caves of Yagul and Mitla in the Central Valley of Oaxaca	Mexico	2010	iii
Petroglyphic Complexes of the Mongolian Altai	Mongolia	2011	iii
Twyfelfontein, or /Ui-//aes	Namibia	2007	iii, v
Rock Art of Alta	Norway	1985	iii
Cultural Sites of Al Ain (Hafit, Hili, Bidaa Bint Saud and Oases Areas)	United Arab Emirates	2011	iii, iv, v
Kondoa Rock-Art Sites	United Republic of Tanzania	2006	iii, vi
Monumental Earthworks of Poverty Point	United States of America	2014	iii
Matobo Hills	Zimbabwe	2003	iii, v, vi

• *Table 11: World Heritage List of properties with fishermen-hunter-gatherer settlements selected for comparison with the settlement and artificial mummification of the Chinchorro culture.*

The hunter-gatherer lifestyle throughout the history of human evolution was the first and it has been the most successful strategy for survival, covering at last 90% of humanity's history. Within this context then, prominent on the World Heritage List is the case of the Property Sites of Human Evolution at Mount Carmel: The Nahal Me'arot / Wadi el-Mughara Caves (Israel). In it are represented 500,000 years of human evolution, including the co-existence of the Neanderthals and the Early Anatomically Modern Humans during the Musteriense or Middle Paleolithic period. Later, Natufian occupations were verified at Mount Carmel which provided information on the transition from a hunter-gathering lifestyle to agriculture and animal husbandry (ca. 15,000 – 11,500 BP). The archeological evidence found at Tell Aswad (Syria) (vid. 3.2.d.), in the Southern Levant are generally in common with this last-mentioned phenomenon.

With several millennia of difference, the first evidence was revealed in the region of Arica and Parinacota of groups of hunters, fishermen and gatherers during the Early Archaic period (10,500 -7000 BP), and the first adaptations to the coastal environment materialized in the area in a process called maritization (for example, Acha-2, ca. 8900 BP). The hunter-marine gatherers of the Chinchorro cultural tradition appear to have succeeded these first populations, with a cultural development that went from the Early Archaic (ca. 7400 BP), through the Middle Archaic, the Later Archaic up to the Initial Early Formative period. The Chinchorro completed the transition toward a lifestyle based on the production of food toward the end of their cultural sequence (for example, Camarones-15, ca. 4200 – 2850). The characteristics of a direct or an indirect link of the groups of the Chinchorro cultural tradition with the management and consumption of products stemming from the domestication of plants and animals is an issue still not fathomed by archeological research and it still poses a problem that will need to be faced in the future.

Other Properties on the World Heritage List focus on territories where the transformation of a hunter-gatherer economy is transformed into one of an agricultural and/or pastoral nature. In the Prehistoric Caves of Yagul and Mitla in the Central Valley of Oaxaca (Mexico), the first vegetable evidence ever discovered and documented was found regarding the domestication of plants on the continent (10,000 BP) as well as the earliest records for cultigens, such as corn and cucurbit. At the same time, cave art documented the progress of nomadic hunter-gatherers to incipient farmers. Likewise, the nomination refers to the Petroglyphic Complexes of the Mongolian Altai (Mongolia) which described, by means of its funereal monuments and cave drawings, the cultural development of Mongolia over the last 12,000 years as well as their transition to herding as a dominant way of life.

Within the overall context of the nominations mentioned, an important amount of properties can be observed that have been defined by the relevance of the cave art in the settlements of the hunter-gatherer groups (10 cases). So, cases such as the Rock Paintings of the Sierra de San Francisco (Mexico), Chongoni Rock-Art Area (Malawi), Twyfelfontein, or /Ui-//aes (Namibia), Matobo Hills (Zimbabwe), Serra da Capivara National Park (Brazil) or the Rock Art of Alta (Norway) reveal an exceptional nature of spaces intervened by deep-rooted evidence such as cave art and the relevance these types of places had on the social reproduction of the traditions that disappeared of the cultural traditions of hunters and gatherers. The ritual significant of some of these places lasts, regarding some of them, up to today (for example, the Kondoa Rock-Art Sites, United Republic of Tanzania).

Unlike the nominations referred to, the evidence of art cave was not a feature characteristic of the settlement of the Chinchorro cultural tradition. In the region of Arica and Parinacota, cave art has not been recorded along the coast, but rather in the territory abutting onto the sierra (1,900 -3,800 m a.s.l.), in a relatively synchronic lapse of the development of the Chinchorro. These cave art representations were carried out by groups of Andean hunters-gatherers, culturally different from the Chinchorro who did not stray far from the coast. In their majority, the cave art representations feature cameloid figures. In the territory occupied by the coastal Chinchorro hunter-gatherers, on the other hand, the expressions of aesthetic value were found in mortuary rituals, on top of a movable support such as the human body and by means of a plastic job with a technical sophistication and unique form.

Older adaptations to the desert environment are found in the Cultural Sites of Al Ain (Hafit, Hili, Bidaa Bint Saud and Oases Areas) (United Arab Emirates). Just like in the other cases, the Property provides an important testimony to the transition of the local cultures from hunters and gatherers to sedentarism. The Cultural Sites of Al Ain can be compared with the Chinchorro settlement, not only because they lived in a desert environment, but also because they revealed synchronic evidence of mortuary contexts (ca. 4450 BP). Unlike the evidence of the Chinchorro cultural tradition which do not possess any architecturization of the funerary spaces with structures or other features, the tombs of the Cultural Sites of Al Ain are circular structures of stone, some of them the earliest known from the Bronze Age.

Out of all the cases selected for this comparison, only the Monumental Earthworks of Poverty Point (United States) is based on occupations of a sedentary nature of fishermen-hunters-gatherers with adapted aquatic habitats; in this case, the inland riverine environment (ca. 3700 to 3100 BP). The populations of Poverty Point, just like the groups of the Chinchorro culture, based their survival only on wildlife resources, but they did leave evidence of a social complexity by means of the monumental construction of mounds, ridges and a central plaza for residential and ceremonial purposes. The Chinchorro cultural tradition, toward ca. 3700 BP is the bearer of a marine and fishing tradition that goes back some 5000 years and which does not possess any movable evidence of a complex nature, such as monuments. Its complexity, as mentioned within the framework of this nomination, lies in the system of beliefs that determined a refined funereal art such as the artificial post mortem intervention of the human body; especially infants and unborn babies.

Conclusion regarding a comparison with cases on the World Heritage List

When comparing the Settlement and artificial mummifications of the Chinchorro culture in the region of Arica and Parinacota with other cases on the World Heritage List, it appears, at least within a UNESCO context, that there is no other Property that possesses the same combination of values and attributes. The cases mentioned here enable us to conclude that the millennial cultural tradition of marine hunters and gatherers, such as the Chinchorro, the qualities of their settlement and the attributes of their artificial treatment post mortem are unique and outstanding within the framework of heritage as whole. The value that the Chinchorro cultural groups placed on infancy by means of artificial mummification does not have, in the cases reviewed, any details that enable comparisons to be made in this respect and this is what grants a more profound degree of distinction to the value of the Property.

The context of coastal hunter-gatherers is not represented on the World Heritage List. Only some cases of the Tentative List (for example, Jômon Archaeological Sites in Hokkaidô, Northern Tôhoku, and other regions in Japan) stand as evidence of this lifestyle, but not with any exceptional features about the post mortem treatment of their deceased. On the World Heritage List, the properties that appear to contain ritual and symbolic aspects of the lifestyles of hunter-gatherers are based on immovable properties, such as cave art and monuments. On the other hand, when observing the Chinchorro cultural tradition in the long term, the conclusion is reached that this symbolism was not expressed by intervening or building around the environment but based on human bodies.

The Settlement and artificial mummification of the Chinchorro culture in the region of Arica and Parinacota (Chile) appears to contain unique contexts that testify to the existence of populations now disappeared and dependent, over a long period of time, on the sea; using a means of production that was simple, combined with a symbolic and ritual complexity unprecedented in the history of humankind.

Artificial mummification within the global context

Artificial mummification, understood as the preservation of human bodies using anthropic means, includes manipulating internal organs and conserving soft tissue. Cases of cultures are known all over the world that implemented this response to death as a way in which to express the significance of the physical body. Such is the case in recent times of the “Fire Mummies” of the Ibaloy people in the Philippines, the smoked body traditions of the Anga culture in Papua New Guinea and the Buddhist practice of self-mummification¹⁸.

Without a doubt, the case of the Egyptian mummies is the best-known example worldwide, but it is not the earliest occurring during the development of mankind. Egyptian mummification processes guaranteed, by artificial means, ongoing survival after death, using artificial treatment procedures that took place almost two thousand years after the Chinchorro tradition. The predynastic tombs of Hierakonpolis were built ca. 5550 BP from which evidence was obtained of the first attempts at artificial mummification in Egypt. Already by ca. 4650 BP the Old Kingdom period of ancient Egypt began, which was when innovations were introduced to artificial mummification, widely using soda (hydrated sodium carbonate), oils, perfumes and resins as well as the regular use of plaster face masks. Simultaneously, artificial mummification in the Chinchorro culture began to be carried out by filling the bodies and which were then usually painted red. Bodily fill-in procedures were also carried out in Egypt during the New Kingdom period, ca. 3500 BP. With the beginning of the Third Intermediate Period of ancient Egypt, new inventions were implemented to give the body a more real appearance: wigs, false eyes, fill-ins and paint as well as the separate mummification of internal organs. The Egyptian mummification tradition ended formally in the year 392 CE, when the Roman Emperor, Theodosius I decreed that these procedures cease¹⁹.

When comparing the evidence of the artificial mummification of the Chinchorro cultural tradition with that of ancient Egypt, it can be observed that both cultures lived during a simultaneous period of time: in an arid, desert environment where the natural mummification of bodies sprung up spontaneously. Both cultural developments, nevertheless, possess radical differences in socio-economic and political terms, because the Chinchorro – unlike the Egyptians – were small groups of fishermen devoted also to hunting and gathering, without any written language or any complex political organization. Whilst in Egypt, artificial mummification was reserved for the higher classes and for royalty, the Chinchorro contexts of Arica and Parinacota reveal that this was carried out on ordinary men, women and, especially, unborn babies and infants; i.e. across the whole of the social spectrum²⁰.

To prove the comparison, we shall just take as an example the list of attributes of the archeological sites related to “human evolution” in accordance with the classification methodology of the UNESCO (REF SANZ 2012). This category is used because it provides attributes for analysis we find in some of the Chinchorro sites and it allows us to sort in a proper order the qualities of these archeological sites (Table 12).

² The original category refers to fossils but bearing in mind that in our case we are dealing with archeological sites in the category of hunters-gatherers from the Holocene period, it is exchanged for cultural materials.

³ The original category refers to human evolution but bearing in mind that our case deals with archeological sites corresponding to hunters-gatherers of the Holocene period, it is exchanged for South American Archeology as a category of “greater impact”.

RITERIA FOR ASSESSING THE VALUE OF THE SITES TO BE COMPARED	COMPONENT OF THE FALDEO NORTE DEL MORRO DE ARICA	COMPONENT OF THE DESEMBOCADURA DE CAMARONES
1. Sites in good condition over time	✓	✓
2. Sites with important amounts of cultural material ²	✓	✓
3. Sites with finds that represent periods scarcely represented	x	x
4. Sites with an archeological potential	✓	✓
5. Groups of sites closely related or landscape or cultural paleo-landscapes	✓	✓
6. Sites with a South American archeological importance and/or cases of mummification ³	✓	✓
7. Cultural deposits that enable a paleo-environment to be reconstructed	x	✓
8. Cultural deposits with human remains (intentional)	✓	✓
9. Remains of human settlement open to the sky or in caves, either as a temporary occupation or long term	✓	✓
10. Settlements related to a hunting, fishing and gathering system	x	✓

• *Table 12: Attributes of the Chinchorro archeological sites for a comparative analysis.*

For more information about the comparative study see Annex 6: Publication: The Chinchorro Culture: A Comparative Perspective: The archeology of the earliest human mummification. (N. Sanz, B. Arriaza, V. Standen editors, 2014)

• **Sites with good chronologies (1) and with large amounts of cultural material (2).**

Especially the archeological deposits acknowledged as Chinchorro appear to possess a level of preservation that has led to a large volume of research: more than one hundred scientific publications and a total of 45 dating of different archeological contents, cultural materials and/or human bodies, covering a timeline of at least 4000 years during the Holocene period (7000 – 2800 BP).

This excellent preservation has been of benefit to a unique state of conservation of different materials; from artifacts of organic origin up to inorganic materials. Without a shadow of doubt, this has been an incidental factor during the study of the Chinchorro archeological contexts conducting, above all, a detailed study of the technologies of the complex post mortem preparations by the early groups of hunters-gatherers and fishermen in this area; also becoming a point of reference for studying these societies within the Archaic period in the Coastal Desert of the Pacific.

Sites with archeological potential (5), of South American archeological importance and/or cases of mummification (6) and cultural deposits with human remains (8). The Chinchorro archeological deposits included in this nomination appear to have a high archeological potential in situ that will help future research. Funereal areas are conserved in the sector of the Faldeo Norte del Morro de Arica covering almost 30,000 m². Likewise, at the Desembocadura de Camarones there are still some visible signs of a deep stratigraphy around the domestic and funeral areas, as well as in a vast sector of middens covering a polygon of more than 100,000 m² in size.

The archeological sites nominated are also of an archeological and scientific value in South America because they are witnesses of the lifestyles of the hunter and fishermen groups along the Pacific coast. Moreover, these deposits are a material reflection of human adaptation to one of the most arid regions in the world and one, moreover, that enjoys a prodigious marine ecosystem. This is represented in the species of marine and terrestrial fauna recovered from the archeological contexts, especially the rubbish dumps and middens such as those at Camarones.

The Chinchorro funeral sites are material evidence of the earliest artificial mummification to date. A study of this type of funeral manifestation has also enabled it to be established that the type of procedures that were carried out point to a complex method of bodily alteration, plastering, filling in and application of color on the bodies of both the adults as well as – in their majority – infants. Also evident was the intention of furnishing the bodies with different offerings which opens the possibility of inquiring into the materials and their properties within the contents and symbolism of their funeral rites.

Concerning this same matter, the bodies provide us with information on the biological characteristics of these

populations. Proof of this are the results of a lot of research carried out focusing on a study of this issue, enabling the diet, biological profile and lifestyle of these populations to be rebuilt.

Cultural deposits enabling a paleo-environmental reconstruction (7). Studies have allowed us to characterize and understand a part of the natural and paleo-environmental landscape as a scene drawn of the groups of hunter-gatherers and fishermen. This has meant changes in the ecology, climate as well as marine regression and events caused by ENSO during the Middle Holocene (5000–4000 BP). These changes in the environmental and geo-morphological conditions of the coastal desert of Atacama have achieved a reduction in the marine resources available and in less sources of sweet water.

Remains of human settlements, open to the sky or in caves, either temporarily occupied or long term (9) related to the hunter, fishermen and gatherer systems (10). The type of archeological deposits designated as Chinchorro refer to extensive funereal sites that gather together bodies artificially and naturally mummified. Then, a second type refers to the domestic deposits, among which we find the rubbish dumps, middens and sectors defined as residential and which, in many cases, reveal bodies mummified and not mummified below the floors occupied by the residents or inside their foundations.

3.3. Proposed Statement of Outstanding Universal Value

The north coast of the Atacama Desert, in an arid and hostile habitat, was home to the Chinchorro, a society of marine hunter-gatherers during the period between approximately 7400 to 2840 AP. They developed an early and successful adaptation of an extreme geography represented by the juxtaposition of a hyper-arid coastal desert rich in extraordinary marine resources, scant river courses and the rugged relief of the Coastal Cordillera.

This unique adaptation gave rise to the Settlement and artificial mummification of the Chinchorro Culture which is found on the Faldeo Norte del Morro de Arica and at the Desembocadura de Camarones; two sectors that are unique and outstanding witnesses to the Chinchorro Culture and which preserve an environmental context in archeological sites with a profound stratigraphy as well as an extraordinary conservation of organic and cultural remains – offering a unique record of the development of the hunter-gatherer societies in the center-south Andean region.

The funereal traditions of the Chinchorro are present in the Property and this is particularly found in the practice of artificially mummifying bodies using highly developed and specialized skills. This treatment is in addition to the unprecedented practice of rebuilding and remodeling the bodies of complete individuals of all ages, but especially children and unborn fetuses^{1,3}. Because of the archeological sites, stratigraphic deposits and human remains salvaged over a century of archeological research, we now know that the bodies artificially mummified reveal a wide variety of technical and material practices as well as plastic solutions.

The Property is a unique witness to the whole of the sequence of the cultural development of the Chinchorro groups and their exceptional tradition of funerary art which has enabled us, over several decades, to research, get to know and interpret the lifestyle of a coastal hunter-gather society and their vision of the afterlife, characterized by the oldest artificial mummification practice of bodies and which, with several cultural variances, lasted for 4000 year.

The immeasurable remains of this material and the mummification techniques of the Chinchorro are of utmost scientific importance to the world because they challenge the academic community to reconsider their current understanding of systems of beliefs, ritual practices and the social organizations of the very first hunter-gatherer societies.

For more information see Annex 7: Publication: The Chinchorro Culture: Past & Present. (B. Arriaza & V. Standen editores 2016).



4



Defining the areas affected and vouching for the severity of the effects found

As a part of the process of the state of conservation of the Property, the areas affected were discriminated in each component of those areas that do not appear to have any changes to the naked eye. The first ones were validated according to the alteration incidence (severity) described in Table 13.

Initially, the alterations were valued and recorded in the sub-sectors for each component (Tables 15 and 16). A calculation of the incidence of each alteration was obtained because of evaluating a series of qualitative parameters that define how the change occurred: *intensity*, *spatial scale*, *temporal scale*, *trend*, *reversibility*, *cause-effect relationship*, *periodicity*, *synergism*, *persistence* and *time*. Each one of these parameters was assigned a numeric code A (a higher number if it was unfavorable and a lower one if favorable). Finally, the rate of incidence was equal to the weighted sum of these variables. In this case, those of *intensity* were considered as more relevant (where the maximum rate refers to the alteration of the stratigraphy and the minimum to superficial changes), *spatial scale* and *temporal scale* (a breakdown can be found in Annex 8).

$$\text{INCIDENCE (I= 3I+3SS+3TS+2T+ 2R+2CCR+2P+2S+P+M)}$$

(the maximum rate for each alteration 210, minimum rate 0)

$$\text{STANDARDIZED INCIDENCE INDEX}$$

$$I_s = (I - I_{\min}) / (I_{\max} - I_{\min})$$

(between 0 & 1)

The total valuation of the severity of the alterations recorded per sector, was determined by means of adding up the incidence index, with standardized rates between 0 and 1.

With the rates obtained, a simple interpreted significance scale was determined (Sheet N° 28 and N° 30):

- **Low severity (≤ 0.25):** In the sector affected, the incidence and the manner of alteration consigned are not significant as regards any variation in the overall conservation of the Property's attributes. The sector may be superficially affected; however, its general condition is stable, and the subsoil has is not altered.

- **Moderate severity ($0.26 \leq I \leq 0.5$):** In the sector affected, the incidence and the manner of alteration consigned are partially significant about any variation of the overall state of conservation of the Property's attributes. The stratigraphic deposits may be affected, but they are somewhat localized. The deterioration is controllable, reversible and it does not persist over time.

- **High severity ($0.6 \leq I \leq 0.75$):** In the sector affected, the incidence and the manner of alteration consigned are severe about any variation in the overall state of conservation of the Property. A commitment of the partial alteration of the attributes is evident, thus reducing its significance.

- **Major severity ($0.76 \leq I \leq 1$):** In the sector affected, the incidence and the manner of alteration means there has been a considerable and irreversible loss of attributes.

SEVERITY ASSESSMENT ON THE COMPONENT OF THE FALDEO NORTE DEL MORRO DE ARICA		
Affected sector	Value Severity	Hectares affected
Colón Site 10 Museum	Low	0.3
Morro 1/5, Morro 1/6	Low	2.57
Reserva N°2	Moderate	0.4
Morro 1	Moderate	0.1

• Table 15: Severity assessment on the component of the Faldeo Norte del Morro de Arica.

SEVERITY ASSESSMENT IN THE COMPONENT OF THE DESEMBOCADURA DE CAMARONES		
Affected sector	Value Severity	Hectares affected
North Terrace	Low	0.3
South Cliff Plain	Low	3.1
South Terrace	Moderate	11
Debris Slope	Moderate	3.52

• Table 16: Severity assessment in the component of the Desembocadura de Camarones.

Because of valuing the severity of the effects of the alterations, a proposal was made aimed at the conservation action established in the *Program of Conservation for Archeological Settlements of the Chinchorro Culture in the Region of Arica and Parinacota* (see chapter 5e).

In addition, this was prepared based on the opinions and recommendations generated during the activity of the *International Workshop on Conservation: Guidelines for the Conservation of the Archeological Settlements of the Chinchorro Culture, Region of Arica and Parinacota*, conducted in the city of Arica on July 25, 26 and 27 Julio, 2018. Because of the experience and the opinions of an inter-disciplinarian group of national and international experts, a theoretic and methodological analysis was carried out concerning the conditions for the conservation of the archeological settlement. A document was generated as a final product that compiled a consensuated body of principles and strategies that would guide decisions for future administrators.

See Annex 9: *Agreed recommendations concerning guidelines & strategies for the conservation of the archeological settlements of the Chinchorro Culture, Region of Arica & Parinacota. International Conservation Workshop, July 2018.4.a.1.3 Summary of the state of conservation of the attributes of the Property.*

The need should be stressed for weighing the factors and the alteration effects present in the Property. Despite identifying areas altered on the surface, the excellent state of conservation of the attributes found below the subsoil should be highlighted. Table 17 shows a summary of all the conditions preserved for thousands of years and which clearly reveal their OUV.

STATE OF CONSERVATION OF ATTRIBUTES IN BOTH COMPONENTS	
Attribute	Present situation
1. Environmental Context	a) The geo-morphological features representative of the environmental context are preserved, extant during the occupation, providing evidence of the climatic conditions, the characteristics of the relief, the sources of water and the main characteristics of the biotic environment of the Chinchorro groups.
	b) The spatial continuum was maintained of the occupation by the Chinchorro groups, providing evidence of a relationship between their way of life and their use of the territory.
	c) The conservation of the visual flow of the Chinchorro culture and natural environment
	d) Stratigraphic deposits have been preserved as evidence of different paleo-environmental processes.
2. Cultural Deposits (Surface & Subsoil)	a) They have an original localization within an environment that enables us to get closer to the socio-environmental content of the past.
	b) They act as reservoirs in situ of the archeological and bio-anthropological evidence of the Chinchorro culture. The cultural material provides general information concerning the settlement (for example, activities involving obtaining resources and their manufacture as well as their variability over time), the technology (for example, type of artifacts and how they varied over time), subsistence (for example, food resources and their variation over time) and/or funeral rites (for example, bodies artificially mummified, bodies without any artificial treatment, shrouds and funeral paraphernalia gear, etc.) used by the Chinchorro groups.
	c) They appear to have a considerable degree of integrity, size and completeness that enables aspects concerning their lives and the social complexity of the Chinchorro culture to be evident.
	d) They preserve the structure of the deposits, thus providing an account of the spatial – timely sequence of events such as the occupation and human activity of the different cultural groups, including the Chinchorro communities.
	e) They preserve the originality of the archeological contexts as regards their characteristics of dispersion (horizontally), depositions (vertically), organization (spatial relations) and density (amount, concentration) of the archeological materials and their bio-anthropological evidence.
	f) They preserve their original morphology and stratigraphy as evidence of the interaction between the human activity and the geo-morphological processes during the period of the occupation, providing an account of their evolution within the archeological context in relation to their environment.
	g) They gather together all the conditions that provide the Property with a scientific value and a potential for future study.
3. Archeological Sites	a) They conserve their stratigraphy, providing an account of the spatial – timely sequence of the events of human occupation and activity of the Chinchorro cultural groups.
	b) They preserve the originality of the archeological context about their characteristics of dispersion, deposition, organization and density of the archeological materials as well as their bio-anthropological evidence.
	c) They conserve their stratigraphy, thus providing an account of the use and original functions of the one same place over time (up to the present) (for example, middens, cemeteries).
	d) They act as reservoirs in situ of the archeological and bio-anthropological evidence of the Chinchorro culture. The cultural material provides general information concerning the type of site, its use and functions.
	e) They appear to have a considerable degree of integrity, size and completeness that enables them to be studied and compared with other archeological sites of Chinchorro settlements.
	f) They possess a degree of conservation that enables samples to be taken for dating purposes and other specialized analyses.
	g) They are a source of all the scientific information generated as a result of systematic archeological digs.

STATE OF CONSERVATION OF ATTRIBUTES IN BOTH COMPONENTS	
Attribute	Present situation
4a. Archeological Evidence	a) They maintain their original place of deposition, conserving associative features in relation to other archeological elements (the formation of contexts) and to the environment (local and not local).
	b) They conserve in situ their formal and material characteristics, providing evidence of the way of life of the hunter and gathering groups along the coast and their means and modes of production.
	c) They conserve in situ their material characteristics that provide us with an account of the diversity of components used for preparing their artifacts (for example, vegetable fibers, timber, bone, lithics, wool, etc.) and their interaction with the environment to obtain such raw materials.
	d) They conserve in situ their formal and material characteristics, providing evidence of their manifest technical expertise in many ways; functionally efficient for interacting with the coastal environment (for example, fish hooks, shell fishing tackle, harpoons and nets, etc.) and on land (for example, the points of projectiles, spears, grinding instruments, vegetable matting, etc.), among others.
4b. Bio-anthropological evidence (with or without any complex treatment)	a) They maintain their original place of deposition, conserving associative features in relation to other bodies (the formation of sets).
	b) They conserve in situ a degree of material conservation that safeguards their uniqueness and exceptionality as regards the evidence of the funeral rites of the Chinchorro culture over time.
	c) They preserve in situ a degree of conservation of the material elements and the characteristics of form and design of the bodies that enables the general types of mummification to be identified (for example, black, modeled or red mummies). These types have a chronological correlation.
	d) They preserve in situ a degree of conservation of the material elements and the characteristics of form/design that provide evidence of the technical and aesthetic practices by means of which both the exterior (for example, coverings of skin, paint, coverings with racks of fibers, incisions or models of facial features) as well as the insides of human bodies (for example, structural parts, ties, filings of thoracic, abdominal and pelvic cavities) have been treated.
	e) They preserve in situ the materials and substances used when preparing the body, providing an account of the operational production chains and the relations the people established with their environment.

• Table 17: State of conservation of attributes in Component 01 and 02.

4.a.2. The environmental context as a part of the Chinchorro culture and its present state of conservation

The environmental context within which the Chinchorro culture developed accounts for all the elements making up their environment and the relations among these elements. These include the climate, features of the relief, sources of water and natural beds, all the organisms that constitute biodiversity and the relations extant between these elements.

This environmental context, of which the Chinchorro group are only a part, is not independent from their culture and it enables their way of life to be put into context and better understand both how they lived as well as what changes there have been up to today.

As set forth in chapter 2, the natural environment in which the Chinchorro culture developed is characterized by the scant to nil precipitation (less than 1 mm per annum at present) in a desert climate with abundant cloud cover. The river beds found in the area close to the components of the Property are the San José River and the Camarones River, which drain the highest part of the region, so their flow is determined by whatever rain or snowfall as well as storms there happen to be in the Cordillera of this region in Summer (a phenomenon known as "Cordillera Winter"). Regionally, the Coastal Cordillera appears to be one of the main units of relief. Along its western flank, other geomorphological units can be distinguished, albeit on a smaller scale, such as valleys, marine terraces and river terraces. All these features in the relief are the ones that make up the environment in which the Chinchorro culture developed, above all the occupation of the slopes, coastal cliffs and the flatter sectors associated with terraces and areas around the mouths of the rivers.

This natural environment has undergone modifications over time; however, the main features of its relief and the configuration of the coastal environment have remained like the panorama existing during the occupation (for greater details, see chapter 2b). The principal modifications of the environment are related to present human activity. The components of the Property are found amid functional territories, the basic difference between them being that whilst along the Faldeo Norte del Morro de Arica the socio-economic development is of an urban nature, in the Desembocadura de Camarones it is still rural. As an example of this, the Region has a

total population of 239,126 inhabitants, 98% of which resides in Arica whilst this figure only amounts to 0.3% in Camarones. This means that the development of the different types of activities – productive, projects and investments in public-private works and urban housing as well as human activities associated with the normal use of these spaces - must be treated separately.

In the case of component 01 Faldeo Norte del Morro de Arica, the natural environment of the settlement is urban. The area of the Property is located less than 2 Kms. from the mouth of the San José River and in its surroundings, a wide terrace of costal and alluvial origin developed (Figure 77). Given its proximity and relevance as a source of water, the presence of the San José River would have had to be fundamental for the existence of a settlement close by, so it can be considered as a relevant environmental attribute within the environment of the Property. Having said that, the bed of this river is currently being channeled by works and its banks have been urbanized. Moreover, the terrace has been gradually occupied for the city sprawl stretching north. This means that, despite the archeological sites and human and material remains found there conserve their integrity, the environmental context of this component has been modified and over it an urban environment has developed that has tended to hide the original environmental context of the occupation. Despite this though, the main features and components of this environmental context can be inferred because of geomorphological reconstructions and paleo-environmental studies.



• Figure 77: Aerial view showing the environmental context associated with the component of the Faldeo Norte del Morro de Arica as it stands today.
SOURCE: URRESTY, C. 2018

Regarding component 02 Desembocadura de Camarones, the situation is a lot different because, due to its rural state, no major modifications have been made associated with urban development. The main characteristics of the area and the geomorphological features of the component (river valley, terraces, river bed, banks) have remained the same over time and at present they are very similar to how they were during the occupation. Although local variations must have taken place due to the occurrence of natural events such as large earthquakes, geomorphological processes, they have not had any major impact on the scale of the environmental context of the component. This means that the environmental context in which the occupation developed is highly integral, allowing us to understand the way of life of the Chinchorro culture within the context of its natural environment.

A summary of the main features of the natural environment, the spaces used by the Chinchorro and the modifications to their surroundings are shown in Table 18.

USES AND CHANGES OF THE MAIN FEATURES OF THE NATURAL ENVIRONMENT OF THE COMPONENTS OF THE FALDEO NORTE DEL MORRO DE ARICA AND DESEMBOCADURA DE CAMARONES.			
Component	Main Environmental Features	Spaces Directly Occupied	Modifications Of The Environmental Context
Faldeo Norte del Morro de Arica	Morro de Arica (Coastal Cordillera), the terrace associated with the mouth of the San José River and bed of the San José River.	Faldeo Norte del Morro de Arica, flat sectors that make up the terrace	Urban development of slopes and flat sectors. Channeling the bed of the San José River and the urban development of its banks.
Desembocadura de Camarones	Coastal cliffs (Coastal Cordillera), valley of the Camarones River and terraces associated with it, mouth and beach.	Coastal cliffs, South Terrace	Without any major modifications in accordance with what information there is available. Only natural movements of slopes associated with mass movements. Although they do have an impact, their effects are only felt at a very local scale (on a scale of archeological sites and at specific places), without disturbing the environmental context of the component.

• *Table 18: Uses and changes of the main features of the natural environment of the Components of the Faldeo Norte del Morro de Arica and Desembocadura de Camarones.*

4.b. Factors affecting the property

Scale of the analysis

The territorial scale in which the factors and alteration processes affecting the Property are being analyzed. If we consider a regional scale, attributes can be identified that are transversal within this system of the Chinchorro culture and which prevail over and above the particularities of the components of the Faldeo Norte del Morro de Arica and the Desembocadura de Camarones. Such is the case of the geological and climatic characterization of these spaces which, in general terms, enables us to standardize a causal relationship when explaining some of the hazards identified (seismicity and induced seismic effects).

Focusing on a lesser scale, it is possible to identify common conditions between both components. This is the case of some criteria in relation to the use of the space where occupation of the slopes, coast and mouth prevails. Also, a similarity can be determined between the physical properties of the human and cultural remains that make up the Chinchorro archeological records (vegetable fibers, lithic, malacology, among others).

This explains, to some degree, the definition of similar problems involving the conservation in both components, although not the severity of the effects of alteration which ultimately leads to a different state of conservation between both components.

Types of transformation factors

- Determination:** General intrinsic factors that benefit or interfere with the development of the alteration processes, both of a natural as well as human origin.
- Triggers:** Factors of an extrinsic nature that trigger alteration processes.
- Underlying factors:** Factors which, when interacting with other factors, tend to increase the adverse effects caused by an original event. In the case of both components, intrinsic factors can be identified (inherent to the Property) and extrinsic (physical, socio-economic changes and deficiencies in management and aspects related to tourism). They are the most important aspects dealt with in the *Program on conservation and the risks of the Chinchorro culture settlement*.

Factors classified according to their origins

The main visible signs of the transformation of the Property are the results of interaction between external alteration factors (natural and human) and the intrinsic properties of the archeological contexts. They may be present or potential and positive or negative.

External factors of a natural origin:

Associated with the physical attributes that characterize the spaces occupied by the Chinchorro. Among them are such relevant geological, geomorphological and climatic factors (internal and external) or a combination of them all and/or any other factors (human and intrinsic).

It should be stressed that although the characteristics of the environmental contexts could determine the vulnerability of the archeological contexts, these conditions do not necessarily mean a deterioration of the Property. The transformation rate associated with environmental factors is very slow; finally reaching a happy balance in harmony with the environment.

An example of a positive factor is the scant precipitation in the area and the salinity of the soil. Both environmental factors have benefited the preservation of the archeological contexts for thousands of years.

External factors of human origin:

The human factor is significant inasmuch that it acts simultaneously as a determining, triggering and accelerating factor of now processes of deterioration, besides generating synergy with natural factors, they reinforce the latter's possible negative factors.

It is interesting to distinguish between the transformations generated in the past by the same Chinchorro groups and the present human transformations. Among the former, worth mentioning are the changes in the landscape stemming from the formation of extensive middens. At present, the main source of pressure is related to the urban and rural development of such components as the Northern Slope of the Morro and the Desembocadura de Camarones, respectively.

Intrinsic alteration factors:

Concerning intrinsic alteration factors, it is essential to consider how the inherent characteristics of the archeological components have an influence on changes. These could also be of a positive or a negative nature, but always in relation to another transformation factor (Table 19).

In this sense then, the cultural options that the Chinchorro group had in the past are relevant. As an example, we must mention the selection of certain spaces where their daily and ritual activities took place. Some of these places reveal physical characteristics that act as underlying factors in the face of certain hazards and alterations. So, the location of cemetery-type sites on the steep slopes could be considered as a condition that does not benefit the conservation of the archeological contexts. These sectors are the ones most prone to geomorphological hazards, such as mass movements, commonly observed in areas of soil slides and rock falls (Figure 78 and 79).

This condition is inseparable from natural external factors such as seismicity. Over the past 400 years in the Region, large magnitude events have been recorded in the Region (at least seven earthquakes larger than 8).

Another inter-relationship between intrinsic and human factors of the present day Chinchorro is the vulnerability of the areas used as cemeteries when faced with external mechanical pressures. This is because some sectors of the bodies and the cultural material related thereto were buried only a few centimeters below the ground (30-80 cms); a condition proven by the different archeological digs carried out on the slopes of the Morro and in the Desembocadura de Camarones (Figure 80).

Conversely, a positive condition is the use of vegetable fiber matting when preparing their funeral interments because this is a cultural factor that has benefited the conservation of the bio-anthropological evidence below the subsoil.

Another intrinsic factor to also be considered is the degree of sensitivity of the materials adding to the archeological evidence as well as the bodies mummified artificially, and which react differently when confronted with external agents (climatic, pressures, etc.). However, the degree of the actual exposure of the remains must be determined when affected by such agents because the risk of deterioration varies considerably between those exposed to the outdoors and those lying just below the subsoil.

FACTORS AFFECTING THE PROPERTY.							
Primary Factors	Secondary Factors	Components					
		Faldeo Norte del Morro de Arica			Desembocadura de Camarones		
		Relevant	Moderate& Relevant	Not Relevant	Relevant	Moderate& Relevant	Not Relevant
Buildings and Development	Housing/ urban sprawl		x		x		
	Commercial development/ Encroachment/changes to skyline.			x			x
	Industrial areas			x			x
	Major visitor accommodation and associated infrastructure			x			x
	Interpretative and visitation facilities		x				x
Transportation Infrastructure	Ground transport infrastructure/ roads			x	x		
	Air transport infrastructure; Marine transport infrastructure; Effects arising from the use of transportation infrastructure.						
Underground transport infrastructure			x			x	
Utilities or Service Infrastructure	Water infrastructure		x				x
	Renewable energy facilities			x			x
	Non-renewable energy facilities			x			x
	Localized utilities/energy towers			x			x
Pollution	Surface water pollution			x			x
	Ground water pollution			x			x
	Solid waste		x			x	
	Air pollution			x			x
Biological resource use/ modification	Aquaculture; Fishing/collecting aquatic, Land conversion, Livestock farming / grazing of domestic animals, Crop production, Commercial wild plant collection; Commercial hunting resources Forestry /wood production Subsistence hunting Subsistence wild plant collection			x			x
Physical resource extraction	Mining; Oil and gas; Water (extraction)			x			x
Social/cultural uses of heritage	Indigenous hunting, gathering and collecting			x			x
	Impact by visitors		x			x	
Other human activities	Illegal occupation of space		x			x	
	Illegal excavations		x			x	
	Illegal construction		x			x	
	Deliberate destruction of heritage			x			x
	Military training; War; Terrorism; Civil unrest			x			x
Climate change and severe weather events	Changes to oceanic Waters; Desertification; Drought; Flooding; Storms; Temperature change			x			x

FACTORS AFFECTING THE PROPERTY.							
Primary Factors	Secondary Factors	Components					
		Faldeo Norte del Morro de Arica			Desembocadura de Camarones		
		Relevant	Moderate& Relevant	Not Relevant	Relevant	Moderate& Relevant	Not Relevant
Sudden ecological or geological events	Volcanic eruption			x			x
	Earthquake/ landslide	x			x		
	Tsunami/tidal waves			x			x
	Avalanche			x			x
	Erosion and siltation/deposition	x			x		
	Fire (wildfires)			x			x
Invasive/ alien species or hyper-abundant species	Translocated species; Invasive/alien terrestrial species; Invasive / alien freshwater species; Modified genetic material; Hyper-abundant species			x			x

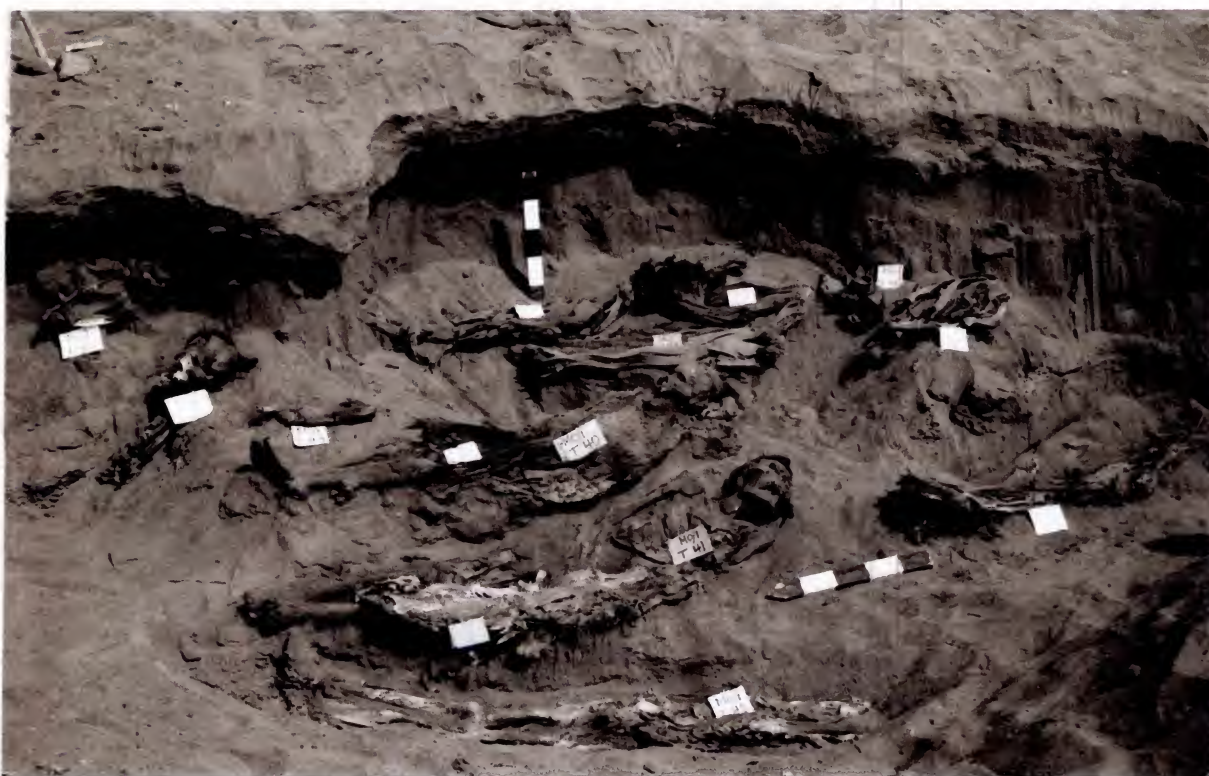
Table 19: Summary of the factors that are currently affecting the Property.



• Figure 78: Faldeo Norte del Morro de Arica. The steep slopes where the cemeteries of the Chinchorro Culture are found.
SOURCE: MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.



- *Figure 79: Desembocadura de Camarones. The steep slopes that characterize the natural and cultural context of occupation by the Chinchorro groups.*
SOURCE: CASANOVA, P. 2017



- *Figure 80: Multiple burials, Morro Site 1, Faldeo Norte del Morro de Arica.*
SOURCE: ALLISON, M, 1997. PHOTOGRAPHIC FUND DEPARTMENT OF ANTHROPOLOGY, UNIVERSIDAD DE TARAPACÁ

Transformation processes

The hazards associated with transformation processes of a natural origin (Table 20) could possibly recur that could be manifested as common events (low intensity earthquakes), isolated events (earthquakes, tsunamis, windstorms), sudden (mass movements) or as a part of synergic processes (soil slides aggravated by human pressure). In the case of large-scale earthquakes, bearing in mind the region's seismic history, they are considered by the local population as common events (Figure 77).

On the other hand, the effects stemming from these processes could be envisaged on a different scale (zonable or otherwise). Whilst an earthquake could affect an area larger than the Property, the effects caused, such as the land splitting and sliding, could have a localized impact on sloping areas.

Component 01, Faldeo Norte del Morro de Arica

Overall, the sector has found itself affected by natural processes which, in terms of impacts, mass movements are more significant. This assessment includes how sudden these phenomena can crop up, especially if they are associated with a large intensity earthquake. Time wise, they are due to isolated events. Mass movements and rock falls are of the more recurring type, mainly recorded along the external rim of the area of the Property and along the north face of the Morro (Figure 81).

Component 02, Desembocadura de Camarones

In this component, mass movements are a geological hazard considered to be of greater relevance in terms of impact on the Property and on the population living there. Just like on the Faldeo Norte del Morro de Arica, the slope of the land and the consolidation of the soil are determining factors, especially in sectors where the slopes have crumbled and where a part of the Chinchorro cemeteries are found (Figure 82). At the same time, earthquakes and human interventions have also had a triggering effect. There is a recurrence, from a historical point of view, of these types of natural events because soil slides and rock falls occur in areas where they also occurred in the past.

We must acknowledge that, at present, it is in the social context of the Chinchorro Culture where the most relevant sources of pressure are found. Prominent in this case are those aspects associated with urban sprawl – on the Faldeo Norte del Morro de Arica – and in rural development – in Desembocadura de Camarones, which directly and indirectly have an influence on the deterioration of the Property.

Both with component 01 as well as component 02, human interventions have only affected specific sectors (Table 21).

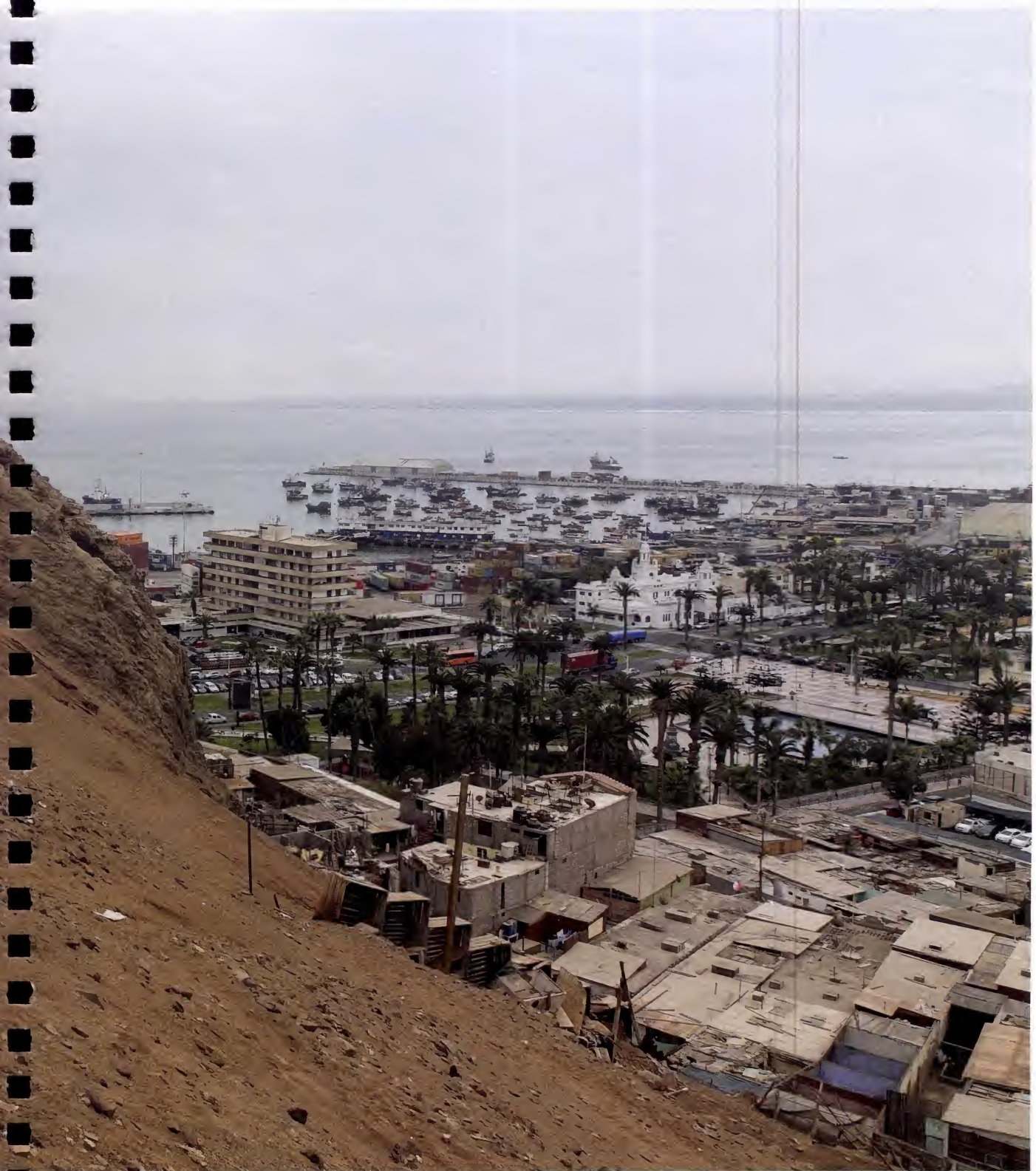
We can establish that the greatest problem with conservation related to pressures stemming from human activity is the magnification of other deterioration caused by natural alteration factors. The synergy, because of the coexistence of several alteration factors, has caused an effect that is greater than the parts taken isolatedly.

With both components, there exists the possibility of controlling future pressures, always tackling underlying factors of change (socio-economic and cultural). So, the pressure stemming from human factors can be controlled and mitigated in the short and medium term.

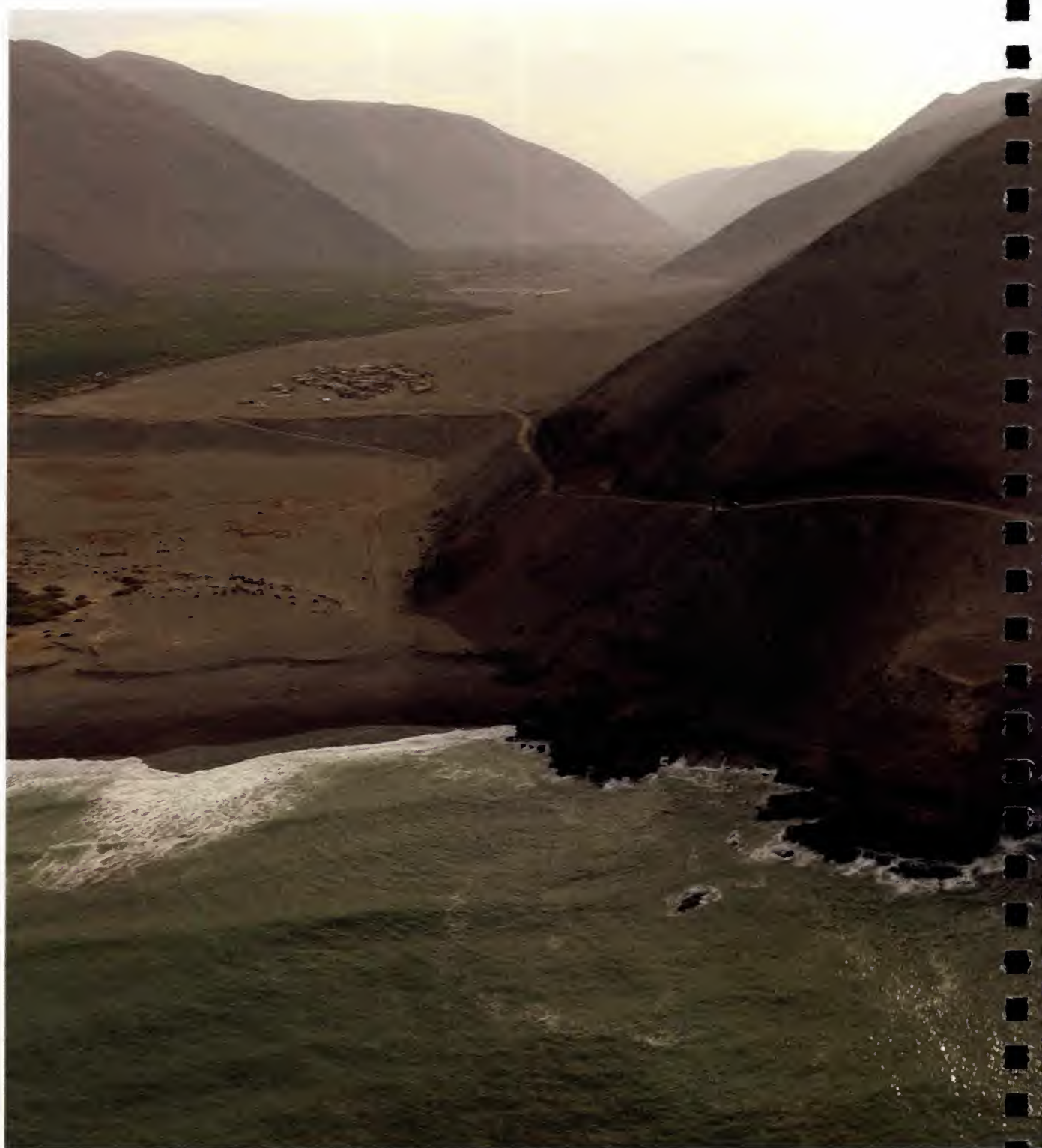
ALTERATION PROCESS AND NATURAL HAZARDS IDENTIFIED ON THE FALDEO NORTE DEL MORRO DE ARICA AND DESEMBOCADURA DE CAMARONES		
Alteration process	Associated hazard (event, phenomenon)	An assessment of impact parameters on the integrity of the property
Geologic	Mass movements	State: current
		Occurrence: sudden.
		Incidence: direct.
		Reversibility: scarce possibility of reverting its effects
		Interrelationship: process synergic with anthropic pressure.
		Spatial scale: Localized. Tending to develop on steep slopes.
	Earthquakes	State: potential
		Occurrence: sudden
		Incidence: direct
		Reversibility: depending on the magnitude, normally irreversible.
		Interrelationship: synergic
		Spatial scale: regional
	Tsunamis	State: potential
		Occurrence: sudden
		Incidence: indirect
		Reversibility: irreversible.
		Interrelationship: synergic
		Spatial scale : regional
	Volcanoes	State: potential
		Occurrence: sudden
		Incidence: indirect
		Reversibility: irreversible.
		Interrelationship: synergic
		Spatial scale : regional
Climatic	Eolic Erosion	State: current
		Occurrence: gradual process
		Incidence: direct
		Reversibility: irreversible.
		Interrelationship: accumulative
		Spatial scale : extensive
	Weathering	State: current
		Occurrence: gradual process
		Incidence: direct
		Reversibility: irreversible.
Hydrologic	Flooding	State: potential
		Occurrence: sudden
		Incidence: direct/indirect
		Reversibility: irreversible.
		Interrelationship: synergic
		Spatial scale : regional

• Table 20: Alteration process and natural hazards identified on the Faldeo Norte del Morro de Arica and Desembocadura de Camarones.





• *Figure 81: North-western sector of the Faldeo Norte del Morro de Arica appears to be at risk of mass movements and rock falls.*
SOURCE: MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.





- *Figure 82: Chinchorro cemeteries in the sector affected by soil slides.*
SOURCE: CRESPO, M. 2017. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.

CURRENT ANTHROPIC ALTERATIONS IDENTIFIED ON THE FALDEO NORTE DEL MORRO DE ARICA AND IN DESEMBOCADURA DE CAMARONES.		
ACTIVE PRESSURE SOURCE	ASSOCIATED HAZARD (EVENT, PHENOMENON)	AN ASSESSMENT OF IMPACT PARAMETERS ON THE INTEGRITY OF THE PROPERTY
UNCONTROLLED URBAN EXPANSION / UNCONTROLLED RURAL EXPANSION	Incorporation of infrastructure on the property and buffer zone	Intensity: significant
		Spatial scale: localized
		Temporal scale: one-off
		Trend: static
		Incidence: direct
		Reversibility: irreversible
		Interrelationship: synergic
	Incorporation of urban elements	Intensity: minor
		Spatial scale: localized
		Temporal scale: one-off
		Trend: static
		Incidence: indirect
		Reversibility: reversible
		Interrelationship: synergic
	Irregular use of the Property	Intensity: minor
		Spatial scale: localized
		Temporal scale: irregular
		Trend: static
		Incidence: indirect
		Reversibility: reversible
		Interrelationship: synergic/accumulation
	Waste Disposal	Intensity: insignificant
		Spatial scale: localized
		Temporal scale: irregular
		Trend: static
		Incidence: indirect
		Reversibility: reversible
		Interrelationship: accumulation

• Table 21: Current anthropic alterations identified on the Faldeo Norte del Morro de Arica and in Desembocadura de Camarones.

Component 01, Faldeo Norte del Morro de Arica

A part of the component has been affected by the presence and development of public works (Viewpoint of the Mirador de la Virgen, water tanks). Moreover, equipment has been installed (rubbish dumps, lampposts, steps) linked to tourist activities carried out on the summit of the Morro. This happens to be a historic geographic symbol associated with the Pacific War and at its top is the Historic Museum of Arica which is visited by approximately 120,000 persons a year.

There are no agricultural, green areas, farming or industrial activities associated with the component.

At present, the sites of Archeological Reserva N°1, N°2 and the sector of the Tanks have been handed over in concession – free of charge – to the University of Tarapacá. This means that the Property's protection is guaranteed by means of the overall administration of the property involving the community living within the sphere of influence of the archeological settlement.

Component 02, Desembocadura de Camarones

The present human intervention of greatest relevance is the construction of a road that cuts through a part of the slope of a hill.

There are facilities devoted to industrial poultry farming inside the buffer area of the Property.

Those activities devoted to recreation are carried out in the sector of the beach, albeit not very significant about affecting the component.

Although this component is in a rural zone, no farming activities are carried out and neither are there any agro-industrial installations.

Interrelation between hazards and transformation factors

Table 22 shows a summary of the relationship between a) the main hazards identified in the Property, b) any adverse hazards associated, and c) the determining and triggering factors linked to the occurrence of an event or phenomenon.

THE PRINCIPAL HAZARDS OF A NATURAL ORIGIN AND THE FACTORS ASSOCIATED THEREWITH	
Hazard of a natural origin	Mass movement (soil slides and rock falls)
Spatial extension	Faldeo Norte del Morro de Arica: a sector with steep inclines, the external border of the area of the Property, on the northern face of the Morro (archeological site Morro 1/5 and sectors of Archeological Reservas N° 1 and N°2).
	Desembocadura de Camarones: Sector with rubble on slope, South Hill.
Determining factors	<ul style="list-style-type: none"> • Geological factor: high seismic activity in the region. Geological characteristics of the rocks (lithology, structures, degree of alteration and meteorization, etc.).
	<ul style="list-style-type: none"> • Geomorphological factor: topography, altitude, extension and gradients of the slopes.
	<ul style="list-style-type: none"> • Intrinsic factor of the soil and rock: type of deposit and its material.
	<ul style="list-style-type: none"> • Biological factor: the amount and type of vegetation (zero in this case).
	<ul style="list-style-type: none"> • Climate: precipitations are not a relevant factor at this altitude. However, humidity is a factor, partially.
Triggering factors	<ul style="list-style-type: none"> • Vibrations (high intensity earthquakes), gravitational processes.
	<ul style="list-style-type: none"> • Human interventions: modifications to the environment like, for example, variations in the slopes (sector of South Hills in the Desembocadura de Camarones and in the sector of Reserva 2 on the Faldeo Norte del Morro de Arica).
	<ul style="list-style-type: none"> • Hydro-meteorological events.
Underlying factors / interactions with other factors that tend to increase the adverse effects	Cultural factors inherent to the Property: selecting the space to be used. In both components, there exists a steep slope on the land where the archeological sites are located (cemeteries, middens and residential).
	Intrinsic fact in relation to the materials found in the archeological records (bone, vegetable fibers, both susceptible to atmospheric alteration agents).
	Problem of human factor: on a part of the slopes, terraces have been shaped, taking advantage of the gradients, for residential purposes. Physical forces (pressure, vibrations, impacts).
Effect	Soil slides / rock falls

• Table 22: The principal hazards of a natural origin and the factors associated therewith.

4.b.i. Development Pressures (e.g., encroachment adaptation, agriculture, mining)

Component 01, Faldeo Norte del Morro de Arica: pressures associated with urban sprawl and its impact on the conservation of the Property.

This component conserves the time and spatial representation of the Chinchorro funeral context because it focuses broadly and instructively on how the types and styles of mummification were representative of the spaces selected for burying their dead.

The Morro de Arica, inhabited since pre-Hispanic times, is now immersed inside the urban sprawl of Arica, specifically in its historic center. Within this context then, the main active source of pressure on it is the urban development of the city.

PROBLEMS ASSOCIATED WITH THE UNRESTRAINED URBAN SPRAWL AND ITS IMPACT ON THE CONSERVATION OF THE COMPONENT OF THE FALDEO NORTE DEL MORRO DE ARICA.
<p>THE INTRUSION OF INFRASTRUCTURE</p> <ul style="list-style-type: none">• A demographic increase and the urban development of the city have meant incorporating urban elements on a larger scale (architectural, highway and hydraulic infrastructure) within the archeological settlement and the buffer zone.• As a direct consequence on the Property, a partial loss has been recorded of the spatial continuity that was characteristic of the occupation by the Chinchorro groups.• In fact, most of the archeological contexts of the settlement were discovered and researched within the framework of infrastructure projects. Among them, those that had the highest impact in terms of spatial extension, reversibility and intensity, was the installation of street lighting and the drinking water tanks and reservoirs for drainage purposes in 1920 and which are no longer used. Also relevant was the construction of the tourist Mirador de la Virgen (2008). This latter work and the corresponding archeological salvage works were regulated under the protection of Monuments Act 17.288. Nowadays, the bodies recovered at both times are now safely in the Archeological Museum of San Miguel de Azapa of the University of Tarapacá. Attached to Annex 3 is a report on the state of conservation of the individuals removed from the excavations of archeological sites Morro 1 and Morro 1/5.• In that same sector, within the framework of a private housing project, a large sized cemetery was discovered and which was left where it was found, thus becoming the Colón 10 Site Museum, currently administered by the University of Tarapacá.• At present, in the sector of the Northern Slope of the Morro, the risk of new urban encroachments has been reduced given the dual protection the settlement now has (as a Historic and Archeological Monument).
<p>INSTALLATIONS OF HUMAN SETTLEMENTS OVER THE COMPONENT AND/OR ITS BUFFER ZONE.</p> <ul style="list-style-type: none">• One of the greatest external pressures affecting the city of Arica is the demand for housing. This has caused the urban area to extend and a proliferation of human settlements in precarious conditions as well as irregular settlements.• Along the north-west edge of the slopes, homes have been established illegally. Nonetheless, these occupations only affect a minimal part of the surface area of the component. Given the characteristics of the buildings, it is a reversible situation. In addition to this, the State, through the Ministry of Land, must put this situation right. A cleanup has taken place aimed at removing the lightweight materials used for the construction of the homes. For this purpose, the job has been coordinated with the neighbors living there and who are represented by their neighborhood leaders.
<p>TOURISM</p> <ul style="list-style-type: none">• Regarding the use of the component by tourists, it was found that the pressure generated is comparatively minor in relation to the impact brought to bear by the pressure of housing or that associated with urban development and it mostly takes place in the higher sectors of the buffer zone. This is because the Morro de Arica receives an important amount of visitors each day, given the relevance of the symbolism of the city's historic past. As a matter of fact, a Historic-Military Museum lies at the summit.• It is in the sub-component of the Colón 10 Site Museum that recreational activities are carried out.

Table 23: Problems concerning urban development and its impact on the conservation of the component of the Faldeo Norte del Morro de Arica.

Table 24 shows a summary of the possible effects associated with urban sprawl in component 01, the Faldeo Norte del Morro de Arica. Table 25 sets forth a description of the state of conservation at present, and what corrective action is being taken regarding the archeological sites located in the component.

FALDEO NORTE DEL MORRO DE ARICA: THE EFFECTS AND CONSEQUENCES ASSOCIATED WITH URBAN SPRAWL			
EXTENT	INTERNAL AND UNDERLYING FACTORS	HAZARDS	POSSIBLE EFFECTS
Environmental Context	Overall deficient urban planning. Limited social appropriation of the heritage	Development of infrastructure works location of urbanistic elements (architectonic infrastructure) Water tanks (1920) Mirador de la Virgen	- Irruption and fragmentation of the spatial continuum of occupation by the Chinchorro groups. - Irruption of the visual flow of the Chinchorro cultural and natural environment.
Cultural Deposits (Surface and subsoil)	Increased demand for housing. Poor territory zoning overall. Consuetudinary use	The illegal use of the land and urban development within the buffer zone of the property. Illegal squatting (currently controlled in the sector of Reserva N°2).	- Cultural deposits are becoming compressed, with surface contamination and a decontextualization of the archeological contexts found below the illegal housing as a result of the use of the daily space. - Informal paths are being trodden. - The land is being eroded. - Mechanical pressure due to trampling. - Archeological elements are now exposed on the surface. - Rubbish is piling up. - Domestic animals are present.
		Altering the land (Terracing along the slope of Reserva N°2)	- Slopes cut. - Gradients changed. - Profiles become unstable
Archeological Sites	Poor planning of overall urban development and insufficient monitoring	Introduction of small sized elements (equipment, lightweight construction). Lampposts, railings around site of Morro 1, steps leading up to the Mirador de la Virgen.	- Irruption of material within the spatial continuum between archeological sites.
Archeological and Bio-anthropological evidence that are semi-exposed and/or on the surface	Poor monitoring. Consuetudinary use	Illegal use Pedestrian footfall over the archeological sites (Morro 1, Morro 1/6, sector of Reserva N° 2).	- Displacement, redeposition and a decontextualization of materials in sectors along slopes. - Surface or semi-surface exposure of human remains and material fragments on flat sectors and on slopes (this increases meteorization). - Breakages (fractures, cracks, fissures) as well as the deformation of evidence. - Disarticulated and incomplete bodies - Meteorization of bio-anthropological remains.

• Table 24: Faldeo Norte del Morro de Arica: the effects and consequences associated with urban sprawl.

STATE OF PRESENT CONSERVATION AND CORRECTIVE ACTION TO BE TAKEN AT THE ARCHEOLOGICAL SITES OF THE FALDEO NORTE DEL MORRO DE ARICA.	
Archeological Site / Sector	Present state of conservation
Morro 1/5 (Sector of Archeological Reserva N° 1)	Access can easily be gained to the archeological site from the Mirador de la Virgen. There are tracks on the ground left by spontaneous pedestrians. The improvement project of the viewpoint that will be carried out by the Municipality of Arica will have a positive effect on the conservation of the archeological site, especially because of installing illumination that should curb the illicit use of the place.
Sector of Archeological Reserva N° 2	The influence of human factors is associated with the activities and use of the spaces, mainly by persons squatting illegally on the land. This situation is about to change thanks to the support provided by the Ministry of Land which is in the process of evicting the squatters. In coordination with the University of Tarapacá and the Municipality of Arica, several cleanup jobs have been carried out. Within the framework of the present gratuitous concession for the University of Tarapacá and in conjunction with the Municipality of Arica, the projects called "Conservation of archeological slopes of the Chinchorro Settlement on the Northern Slope of the Morro. Sector of archeological Reserva N°2" and "Priority Protection Works regarding the Chinchorro Settlement on the Faldeo Norte del Morro de Arica" are being designed. The project will involve execution of the priority protection works for the site which will include a boundary fence and the installation of informative warning signs.
Mirador de la Virgen	Within the framework of the program of Revitalizing Districts and Emblematic Heritage Infrastructure, the Municipality of Arica will carry out the project "Improvements to the Mirador de la Virgen" whose aim is to repair the finishings that have deteriorated as well as the installation of signs and illumination, furniture and the elements necessary for the comfort of tourists visiting the Viewpoint and Shrine of the Virgen del Carmen, as well as whoever attempts to climb the Morro which happens to be the only way the summit can be reached.
Morro 1 Sector of Colón Tanks (Ex- Essat)	It was considered that this sector has been altered, mainly due to human activity. The existence of 3 tanks inside the reserva caused the area to be abandoned since the nineteen nineties. On the other hand, the presence and activities of humans has led to the erosion of the soil and, therefore, the exposure of archeological materials now found on the surface.
Morro 1/6	In this area, the moderately steep slopes on the land make it easier for pedestrians. Archeological, bio-anthropological and rubbish is found on the surface.
Colón 10	An archeological site with funeral evidence typical of the Chinchorro cultural traditions that were accidentally discovered in 2004 whilst building a hotel located at N° 10 on Colón street. The museum was built so as to conserve and protect the archeological site as it stood, and it was opened to the public in 2010. The bio-anthropological remains are protected by a glass platform that is held up by an iron structure. The original home was kept in the same condition and characteristics, and only the bathroom was modified. A second floor was built (which did not exist in the original house) from where the natural and cultural context of the location of the archeological site can be admired.

• Table 25: State of present conservation and corrective action to be taken at the archeological sites of the Faldeo Norte del Morro de Arica.

Component 02, Desembocadura de Camarones: pressures associated with rural development and their impact on the conservation of the Property.

Camarones is a rural community whose demographic difference with the city of Arica is apparent, both at levels and with types of pressures of a human origin present in the component, as well as the effects stemming therefrom and which, in the case of Desembocadura de Camarones, are considerably less in terms of impact (Table 26).

The visual quality of the pristine environment that characterizes the Desembocadura de Camarones is a true reflection of the natural environment where the Chinchorro Culture lived. Even today, there is a privileged view of the Pacific Ocean and its long beaches. The abrupt contrast can also be observed between the arid edges of the valleys and the greenery below, through which the Camarones River flows.

Table 27 shows a summary of the possible effects associated with rural development and tourism in the component of Desembocadura de Camarones. Table 28 shows a description of the present state of conservation and the corrective action taken regarding the archeological sites located within the component.

PROBLEMS ASSOCIATED WITH UNRESTRAINED RURAL EXPANSION AND ITS IMPACT ON THE CONSERVATION OF COMPONENT 02, DESEMBOCADURA DE CAMARONES.
THE INTRUSION OF INFRASTRUCTURE
<p>In 1986, a construction project of a fishermen's cove was implemented and an access road to it. These works, in addition to later interventions (1990), meant cutting across the slope where the housing and cemetery of the Chinchorro Culture was located. This has led to the instability of the land and the risk of soil slides, besides the resulting exposure of the bodies. Although this intervention is irreversible, it could be mitigated by means of reducing vehicle traffic to avoid vibrations of deposits and thus reduce the risk of damage. Also, in 2014, the former fishermen's dock was replaced by new port infrastructure.</p> <p>Near the buffer zone of the component, poultry breeding plants are located belonging to a private company as well as a secondary road running parallel to the main road.</p>
THE INSTALLATION OF ILLEGAL HUMAN SETTLEMENTS ON A PART OF THE AREA OF THE COMPONENT AND ITS BUFFER ZONE.
<p>In a specific sector of the component, a settlement was installed. It consists of lightweight materials (timber and odds and ends), albeit not altering the subsoil. The homes cover a surface area of 3.69 hectares and it is a situation that is completely reversible.</p> <p>The inhabitants in this sector are particularly aware of the Chinchorro Culture and they act as the defenders of the natural and cultural resources found there. Once they became aware of the location of their homes over the archeological sites, they agreed to talk and search for the possibility of going somewhere else. This is being dealt with by the Municipality of Camarones to be carried out soon.</p>
UNRESTRAINED TOURISM
<p>In this sector, activities have increased linked to sightseeing, camping and fishing for sport that are being carried out relentlessly. Incipient archeological tourism has developed in relation to the Chinchorro mummies using, as points of reference, two representative archeological sites: CAM 14 and CAM-SUR (exposed middens). Fortunately, there are no constructions of infrastructure related to the areas used by visitors. However, preexisting paths are used for tours that tend to increase spontaneous visits to the archeological sites (for example, CAM - South).</p> <p>In relation to these types of activities, the greatest problem detected is the nonexistence of concrete measures aimed at protecting the component, besides administering the flow of visitors.</p>

- *Table 26: Problems associated with unrestrained rural expansion and its impact on the conservation of component 02, Desembocadura de Camarones.*



• *Figure 83: Road works that cut through the slopes in the sector of the South Cliff and Desembocadura de Camarones.*
SOURCE: CASANOVA, P. 2017



• *Figure 84: Aerial view of the present human settlement over a part of the archeological site of Camarones 14.*
SOURCE: CRESPO, M. 2017. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.



DESEMBOCADURA DE CAMARONES: EFFECTS AND CONSEQUENCES ASSOCIATED WITH RURAL DEVELOPMENT AND TOURISM				
SOURCE OF PRESSURE	SPATIAL EXTENT OF THE EFFECTS OF ALTERATIONS	INTERNAL AND UNDERLYING FACTORS	HAZARDS	POSSIBLE EFFECTS
Unrestrained rural expansion	Environmental Context	Poor overall planning Limited social appropriation of the heritage	Development of infrastructure works Incorporation of urbanistic elements on a greater scale (Roads running in the direction of the dock)	- Irruption and fragmentation of the spatial continuum of occupation by Chinchorro groups.
Unrestrained rural expansion	Cultural Deposits (on and below the surface)	Increased demand for housing. Poor territorial planning overall. Deficient monitoring, Consuetudinary use	Illegal squatting on land Illegal settlements on the South Terrace	- Compression of cultural deposits, superficial contamination and a decontextualization of the archeological contexts found below the illegal housing projects – informal pathways; - Land erosion. - Mechanical pressure as a result of trampling. - Exposure of archeological elements on the surface. - Rubbish piling up. - Presence of domestic pets.
			Alteration of the land South Terrace sector	- Removal of sand and gravel - Skeletal remains exposed.
Unrestrained rural expansion	Archeological and bio-anthropological evidence semi-exposed and/or on the surface	Poor monitoring. Consuetudinary use	Illegal use Pedestrian traffic on South Terrace, South Cliff and slope	- Displacement, redeposition and a decontextualization of material remains in sectors on slopes - Exposure on the surface or semi-surface of bones and material fragments on flat sectors and on slopes (it benefits the meteorization process). - Ruptures (fractures, cracks, fissures) and the deformation of evidence. - Disarticulation and an incompleteness of bodies - Meteorization of bio-anthropological remains
Unrestrained tourism	Archeological sites	Poor protection	Illegal use Pedestrian traffic. The generation of spontaneous paths and an increase in pressure on the site	- Contamination. - Rubbish piles up. - Displaced and/or eroded soil, material dragged down from higher parts of the slope - Vandalism.

• Table 27: Desembocadura de Camarones: effects and consequences associated with rural development and tourism.

PRESENT STATE OF CONSERVATION AND CORRECTIVE ACTION CONCERNING THE ARCHEOLOGICAL SITES OF COMPONENT 02, DESEMBOCADURA DE CAMARONES.	
Sector of the South Terrace. The sites located in the sector of the terraces with less steeper slopes have sustained human impact, including looting. They are sectors with greater pedestrian and vehicular traffic so they are more exposed to trampling, human erosion and the manipulation of bio-anthropological remains. There are also signs of open archeological excavations (a reversible situation)	
ARCHEOLOGICAL SITE /SECTOR	EFFECTS
CAM 14	Present human settlement over a part of the archeological site. Positively, the community maintains an proactive attitude toward conservation and protection of the resources. This is a site with a high scientific value because it is the location of a midden where the oldest Chinchorro mummies were discovered. However, the excavations carried out since 1977 remain open, thus the archeological evidence is exposed to the effects of wind erosion.
CA-17	

CURRENT ANTHROPIC ALTERATIONS IDENTIFIED ON THE FALDEO NORTE DEL MORRO DE ARICA AND IN DESEMBOCADURA DE CAMARONES.		
ACTIVE PRESSURE SOURCE	ASSOCIATED HAZARD (EVENT, PHENOMENON)	AN ASSESSMENT OF IMPACT PARAMETERS ON THE INTEGRITY OF THE PROPERTY
TOURISM	Vandalism	Intensity: insignificant
		Spatial scale: localized
		Temporal scale: rare
		Trend: decreasing
		Incidence: indirect
		Reversibility: irreversible
		Interrelationship: accumulation
	Mechanical and physical pressure on the stratigraphic deposits	Intensity: minor
		Spatial scale: localized
		Temporal scale: irregular
		Trend: decreasing
		Incidence: indirect
		Reversibility: irreversible
		Interrelationship: accumulation
CA-8	The archeological excavation is open. Complete human bones can be observed inside the excavation as well as small dispersed fragments all over the surface of the site. Works using heavy machinery have been carried out.	
CAM -1 & CAM-2	At site CA-8 there are records of lithic instruments on the surface; with increased amounts toward sites CA-1 and CA-2. These deposits are located on a flatter surface of the terrace, some distance toward the east of the dwellings. The lithic evidence (mostly mortar) is found isolated or grouped together in sectors. Some of these pieces are marked with white paint for archeological records. Other semi-buried pieces are also found exposed to the action of the atmosphere; particularly materials of an organic nature.	
SOUTH HILL SECTOR		
Sector with a geomorphological difference marked by a steep slope with colluvial deposits and exposed profiles of up to 4 meters, as well as a terraced sector that ends at the cliff.		
The natural instability of the pronounced slope increases due to a cut in the slope where a road has been built to access the dock. The archeological sites located on sloping sectors have been partially altered because of soil slides and rock falls which have benefited the exposure of bodies, archeological materials and collapsed structures. Recording – and monitoring them - is therefore, made more difficult. These natural processes have been worsened by pedestrian traffic on the surfaces and an indicator of this is the existence of multiple footprints.		
ARCHEOLOGICAL SITE /SECTOR	EFFECTS	
CAM-SUR	On the north terrace associated with these deposits there are numerous test pits, ditches and mounds of earth that have remained open after the studies. The excavation that remains open at the deepest midden is a tourist attraction in the sector because the stratigraphy of the site can be observed; however, a part of its walls have collapsed due to that same human pressure.	
CAM15-A	More problematic archeological sites in terms of conservation due to their vulnerability in the face of natural and human vulnerability factors. We are dealing with a multi-component funeral sector that is located on a steep hillside where soil slides and rock falls are very common. A part of the site was altered due to a cut in the slope because of road works. In addition to this are the visitors climbing the hill which speeds up erosive processes and soil slides with bio-anthropological remains disarticulated, removed and exposed to the elements. As a mitigation measure the bodies have been reinterred informally; however, a short time afterwards they were once again on the surface. Also, two gabions have been built to one side of the road.	
CAM 15-D		
CAM 15-E		
CAM 15-B	This sector consists of terraced littorals and anthropic deposits located between the road and the coastal cliff. In a north-south direction, this sector is split into two terraces which are connected by pedestrian paths. The north and south of the terrace are connected by different pedestrian paths. This last sector has undergone greater human disturbances, particularly related to looting and/or vandalism. Remains of bio-anthropological and subactual material can be observed on the surface.	
CAM 15-C		

• Table 28: Present state of conservation and corrective action concerning the archeological sites of component 02, Desembocadura de Camarones.

Mitigation in view of pressure linked to urban and rural development

Regarding the pressures mentioned, the State of Chile is already regulating the property with monitoring and control over any illegal occupation of the land on the Northern Slopes of the Morro de Arica and in Desembocadura de Camarones. Work is currently being carried out by a coordinated administration from an inter-institutional perspective which involves both the municipalities of Arica and Camarones as well as those communities linked directly to the sphere of influence of the Property. The aim in the short and medium term is to improve its immediate surroundings, place a value on the sites depopulated and free up the area of construction and materials that are at risk of fires and collapse.

To mitigate any human impacts stemming from tourism, work is currently being carried out placing signs pointing to the heritage inherent in the Property, the closure of informal paths and fencing around the land to restrict free access.

4.b.ii. Environmental pressures

The possibility of the components of the Faldeo Norte del Morro de Arica and the Desembocadura de Camarones being affected by a certain alteration process will depend on two variables (Tables 29 and 30):

- a) How sensitive the material elements in the Property are to the action of the deterioration identified;
- b) How they are currently exposed to certain hazards/deterioration.

Otherwise, it cannot be assumed that the attributes of the Property are not at risk.

Examples of this are the bodies, with or without any artificial mummification, that are found safely below the subsoil. Although they are sensitive to the action of agents that could meteorize them (humidity, temperature, chemicals in the substrate and their degree of insolation), they are kept protected under the sediment and layers of vegetable fiber where they have been conserved for thousands of years in optimum condition.

On the other hand, at some restricted points where a small sample of the bio-anthropological evidence has remained exposed to the atmosphere, the bone and skeletal findings appear to be fissured, cracked, fragmented and pulverized (Table 31).

Component 01, Faldeo Norte del Morro de Arica. Environmental agents and factors threatening the property and its buffer area.

Water:

Flooding because of tsunamis: Yes, there is a risk, although the component is outside the floodplain. According to predictive models of tsunamis developed by the Hydrographic and Oceanographic Service of the Navy (SHOA, 2011), the most likely places affected by possible flooding in the city of Arica are all located below 35 m a.s.l.

- **Contaminants:**

Contaminants transported by air: The city of Arica possesses high levels of lead; however, there is no evidence to suggest that there exists a relationship between contaminants and damage to the archeological sites.

- **Contaminants transferred by contact:**

The use of specific points as areas for dumping rubbish and rubble can remotely account for the risk of contamination because of toxic and/or hazardous substances spilling.

Physical Forces:

Seismic effects and the wind could cause vibratory effects which in specific areas could cause rocks to fall, besides fine layers lying on the soil. In the case of the stratigraphy, some instability, slides, collapses and/or falls of profiles exposed as well as slopes, soil slides and/or rock falls could occur. As a secondary effect, there could be an exposure of bodies and artifacts on the surface (subject to environmental agents) as well as a disassociation of cultural contexts.

Light:

Exposure to light: The damage caused by light is in proportion to its intensity. The bio-anthropological evidence could find itself affected such as that permanently exposed to direct sunlight (direct sunlight is equal to 100,000 Lux) at least 8 hours a day.

High temperatures/direct sunlight: The majority of the archeological remains within these contexts are resistant to high temperatures (bones, lithic, malacology) and there is no evidence of any chemical alterations. Nevertheless, permanent exposure to the environment of other vegetable fibers could cause them to dry up and become fragile.

Wind:

Removal and transport of the surface: Besides the intensity of the wind, erosion of the relief is also associated with the degree of the gradient on the slopes of the sites as well as the sandy texture of their soils.

Elimination and/or abrasion of materials: Because of solid particles transported by the wind colliding with each other (corrasion), mechanical disintegration occurs of materials exposed on the surface.

Wind and sand storms: The risk of a wind storm exists; however, sporadic events occur at least once a year.

Bearing in mind the seismic history of the Region, the agents of greatest relevance for the component are those related to physical forces, particularly vibrations and soil slides that could cause rocks to rupture, soil slides and profiles collapsing, among others. Seismic agents (and earthquakes and tsunamis) are those that could cause the most sudden and violent changes in the earth's relief.

AGENT	SENSITIVE ELEMENT	ELEMENT EXPOSED	ELEMENT AFFECTED BY THE RISK
Water	Environmental context	Environmental context	Environmental context
	Stratigraphy	-	-
	Bodies	-	-
	Artifacts	-	-
Contaminants	Environmental context	-	-
	Stratigraphy	-	-
	Bodies	-	-
	Artifacts	-	-
Dissociation	Environmental context	-	-
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Fire	Environmental context	Environmental context	Environmental context
	Stratigraphy	-	-
	Bodies	-	-
	Artifacts	-	-
Physical Forces	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Humidity	Environmental context	Environmental context	Environmental context
	Bodies	-	-
	Artifacts	-	-
Light	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Diseases	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Body	Body
	Artifacts	-	-
Theft & Vandalism	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts

Incorrect temperature	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Wind	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts

• Table 29: Sensitivity of material elements of the Property in the event of any deterioration on the Faldeo Norte del Morro de Arica.

Component 02, Desembocadura de Camarones. Environmental agents and factors threatening the Property and its buffer area

Water:

Flooding by tsunamis: The area of the valley is prone to flooding because of a tsunami, although there are no historic records of any.

Flooding: In this area there are no historic records of floods occurring. The events that have taken place in the past are set forth in detail in chapter 2.b.

Light:

Exposure to light: The damage caused by light is proportional to its intensity. The bio-anthropological evidence that is permanently exposed to direct sunlight (sunlight equal to 100,000 Lux at least 8 hours a day) could find itself potentially affected.

High temperature/direct sunlight: the majority of the archeological remains in this context are resistant to high temperatures (bones, lithic and malacological items) with no chemical alterations. Nevertheless, permanent exposure to the outdoors by any other vegetable fibers could cause them to dry up and become fragile.

Wind:

Removal and transport over the surface: Besides the intensity of the wind, relief erosion is associated with the degree of the gradient at the sites and the sandy texture of the soil.

Elimination and/or abrasion of the materials: Because of solid particles transported by the wind colliding with each other (corrasion), mechanical disintegration occurs of materials exposed on the surface.

Wind and sand storms: The risk of a wind storm exists; however, sporadic events occur at least once a year, affecting the homes abutting onto the Property which means that material belonging to the owners moves (for example, roofs flying off) and thus the possible intervention of the archeological sites and disturbance thereof.

In sectors where there are slopes (all the CAM 15 sites), the steep slope is the result of the effects of an earthquake (soil slides and collapses), gravity and wind erosion. This could potentially benefit the exposure of the bio-anthropological evidence.

In the South Cliff sector, humidity exists coming from the coast, so this is an area where the soil is humid with a saline coating. On the other hand, movement has been detected of a thin layer of fine material on the slope which is caused by the scant precipitation brought about by the mist that dampens the soil in the early mornings and which, once dry and because of the high temperatures at midday, loses its cohesion, slides and leaves a slope with a film, clear in color.

AGENT	SENSITIVE ELEMENT	ELEMENT EXPOSED	ELEMENT AFFECTED BY THE RISK
Water	Environmental context	Environmental context	Environmental context
	Stratigraphy	-	-
	Bodies	-	-
	Artifacts	-	-
Contaminants	Environmental context	-	-
	Stratigraphy	-	-
	Bodies	-	-
	Artifacts	-	-
Dissociation	Environmental context	-	-
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Fire	Environmental context	Environmental context	Environmental context
	Stratigraphy	-	-
	Bodies	-	-
	Artifacts	-	-
Physical Forces	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Humidity	Environmental context	Environmental context	Environmental context
	Bodies	-	-
	Artifacts	-	-
Light	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Diseases	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Body	Body
	Artifacts	-	-
Theft & vandalism	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Incorrect temperature	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts
Wind	Environmental context	Environmental context	Environmental context
	Stratigraphy	Stratigraphy	Stratigraphy
	Bodies	Bodies	Bodies
	Artifacts	Artifacts	Artifacts

• Table 30: Sensitivity of material elements of the Property in the face of deterioration in the Cove of Camarones.

POTENTIAL TAPHONOMIC EFFECTS ON BIO-ANTHROPOLOGICAL EVIDENCE						
Origin of alteration	Extrinsic factor or alteration	Type of alteration	Alteration mechanism	Damage	Component/ presence of damage (Yes/No)	
					Faldeo Norte del Morro de Arica	Desembocadura de Camarones
Natural	Ground	Physical	Pressure	Fractures, cracks, fissures, bone deformations	No	No
		Chemical	Structural alterations	Structural alterations; decalcification	No evidence	No evidence
		Physiochemical	Precipitation Calcium carbonates	Fine powdery layer; isolated concretions, compact crust	No evidence	No evidence
			Mineral deposits	Manganese Black stains	No evidence	No evidence
	Water	Physiochemical	Structural alterations; acidity	Decalcifications; striations, fissures, parallel undulations	No evidence	No evidence
		Chemical	Saline efflorescence	Exfoliation	Yes	Yes
	Fire	Physical	Morphological changes	Transversal fissures & fractures; lengthwise fissures	Yes	Yes
	Climate (humid, cold, heat, rain, wind)	Physiochemical	Meteorization, erosion	Fissures, exfoliations, fractures, meteorization (whitish and fragile bones)	Yes	Yes
	Geodynamic	Physical	Gradients of slopes (soil slides) Earthquakes (vibrations)	Exposure and displacement of bodies, disturbance of context. Rock falls soil slides, disturbances of context	Yes	Yes
Human (direct actions-unintentional)	Archeological excavations	Physical	Blows with a sharp tool. Disturbances of the context Excavations transferred to the museum	Perforations, fractures, traumatism. Destruction of the context. Fissures, disarticulation, loss, condensation decontextualization	No	No
	Agriculture	Physiochemical	Spades, rakes, machinery, water, toxics.	Perforation, fracture, traumatism, exposure and removal of remains	No	No
	Urbanization/ construction	Physical	Heavy machinery	Perforation, fracture, traumatism, exposure and removal of remains	Yes	No
Human (direct actions – intentional)	Research studies	Physical	Dehiding, skinning, disarticulation, scraping and taking samples	Loss of tissue, etc.; incisions, disarticulation, incompleteness	No	No
Human (indirect actions)	Metals (funeral paraphernalia)	Physiochemical	Metal deposits Corrosion of ferrous salts	Pigmentation of Circular Holes	No	No
	Museology	Physiochemical	Exposure of the bodies to light, HR, microorganisms Handling collections		No	No

POTENTIAL TAPHONOMIC EFFECTS ON BIO-ANTHROPOLOGICAL EVIDENCE						
Origin of alteration	Extrinsic factor or alteration	Type of alteration	Alteration mechanism	Damage	Component/ presence of damage (Yes/No)	
					Faldeo Norte del Morro de Arica	Desembocadura de Camarones
Biological (animals)	Insects anthropoids	Physical	Osteolytic action	Formation of channels rounded or oval that penetrate the diasiphis toward the medular canal	No evidence	No evidence
	Carnivores	Physical	Gnawing	Canals, striations that group together in parallel bunches	No evidence	No evidence
	Herbivores	Physical	Dispersed bones	Bones separated, small fragmentation with double points	No evidence	No evidence
	Birds	Physical	Removal of bones, pecking	Removal, holes.	No evidence	No evidence
Biological (vegetables)	Roots	Physical	Penetrating the bones	Fissures, fractures, bone could crack open	No	No
		Chemical	Osteolysis (osteolytic substances that release roots)	Corrosion of periosteum and grooves	No	No
Biological (microorganisms)	Fungus	Physiochemical	The growth of mycelia, destroying tissue and penetrating inside	Small concentric cavities	No evidence	No evidence

• Table 31: Potential taphonomic effects on bio-anthropological evidence.

Concerning climate change, it is estimated that more scientific studies have to be carried out at a local level in order to determine to what extent this could affect the integrity of the Property in the future, whilst bearing in mind the possibility that modifications could occur in the amounts of precipitation, environmental humidity and temperatures, etc., or increases in the reoccurrence and/or intensity of extreme hydro-meteorological events. However, Chile now has plans to adapt to climate change in different economic sectors. A National Adaptation Plan to Climate Change was also prepared which establishes the general guidelines the country should follow in terms of adaptation. Moreover, a Forestry Policy for 2015 – 2035 was created as well as a new Energy Policy (*Energía 2050*), also including climate change in its design to move forward with a greater stress on the present inventory of emissions and retrievals of greenhouse gases, implementing mitigation measures and encouraging a gradual transition toward an economy with lower carbon emission by 2050.

4.b.iii. Natural disasters and preparedness for risks to the component of the Property

The abrupt geography of the hills and cliffs that are part and parcel of the environmental context, characteristic of the components of the settlements of the Chinchorro Culture, are one of the most determining physical features in most of the natural hazards that potentially could affect or have affected the Property and which act as a risk of permanent or potential catastrophe. To this are added the intrinsic factors that determine the endogenous geodynamic processes that explain the relevant seismic history at a regional level and throughout Chile.

Specifically, the most significant natural hazards that could directly affect the components of the Faldeo Norte del Morro de Arica and Desembocadura de Camarones are of a geological type: seismic phenomena and mass movements whilst within the sphere of influence, or close thereto, is the threat of tsunami regarding both components. Finally, outside the territory of the Property and all over its sphere of influence – when referring to the Cordillera in the Region of Arica and Parinacota – there is the constant threat of volcanic activity.

Seismic threats

Bearing in mind the information gathered, the conclusion could be reached that the area being studied has been affected by large magnitude earthquakes in the past and it is expected that they will continue.

The seismic sources that could potentially have a greater impact on the area are the interplate earthquakes which have the potential to reach magnitudes higher than 8, cause tsunamis and unleash mass earth movements.

Both about the intraplate earthquakes as well as the cortical ones, their characteristics and recurrences are barely known. However, the evidence recollected points to the possibility of the zone being affected by both types of earthquakes. Interplate earthquakes are being recorded all over the country and most of them are of a small magnitude. For this area, the seismic data mentions the occurrence of these earthquakes, so an event of an important magnitude cannot be ruled out in the future.

The information available points to the seismic hazard associated with subduction and interplate earthquakes being even all over the area of the Property, which means the same diagnosis for both components (the Faldeo Norte del Morro de Arica and Desembocadura de Camarones). In the case of cortical earthquakes, there are differences in the level of the susceptibility of each component, because on the Faldeo Norte del Morro de Arica there are no records of active faults within this area of the component or in any neighboring ones. In Desembocadura de Camarones, on the other hand, there are records of active faults which could potentially cause cortical earthquakes that would directly affect the component. However, we do not have enough information with which to estimate recurrences of these events or in any hazard zone associated therewith.

Mass movements

The components have found themselves affected by the descending transport of materials, the most recurring ones being mass movements and rock falls.

In both components, the geological and geomorphological characteristics of the environment are the main factors that condition the potential generation of mass movements, whilst with earthquakes, they are the main triggering factor of these processes.

The number and severity of these effects are in direct relation to the closeness to the epicenter and the magnitude of the event causing it. In addition to this, their recurrence is evident from a historic point of view, because the slides and falls take place in areas where similar events had taken place in the past.

In addition to the previous seismic events is the intrinsic factor of the removal of the steep slope of the land where the archeological settlements are located, and the mechanical resistance of the materials involved.

About the environmental factors triggered of mass movements, comparatively speaking and together with other natural factors, climatic events, particularly the dearth of precipitation in this area – less than 3 mm – they have scant influence on the slides.

Regarding component 01, the Faldeo Norte del Morro de Arica, active mass movements have been spotted, some of them directly affecting the archeological sites on the Property, such as that occurring in Archeological Reservas N° 1 and N° 2. About the latter, there are also records of a possible removal of bodies because of these types of phenomena. As a priority, measures should be taken to help stabilize the slope where these sites are to prevent an occurrence of future mass movements, or at least mitigate effects on the archeological sites.

In component 02, Desembocadura de Camarones, there are also records of active mass movements which mainly refer to soil slides and, to a lesser extent, rock falls which are affecting the archeological sites located in the sector of the South Cliff. Just like in the case of component 01, helping to stabilize the slopes of the south cliff should be a priority and it should be properly designed so as not to interfere with the archeological sites present in the area.

Flooding

Despite the scant to zero precipitations recorded in the area, there are some active natural gullies that could be affected by floods, above all considering that the San José and Camarones rivers originate in the Cordillera where precipitation is higher and where the “Andean Winter” occurs in Summer.

In the case of the Faldeo Norte del Morro de Arica, the perimeter and its buffer zone are located approximately 1.8 kms from the actual bed, so they are not exposed to these types of phenomena (Sheet 29).

Regarding Desembocadura de Camarones, on the other hand, it should be considered that the Camarones River crosses a part of the buffer zone. Despite this, all information available points out that the areas susceptible to being affected by flooding are those lower parts of the valley (active channel, floodplain and the lower terraces), so no archeological site is exposed to this hazard. Besides, the areas susceptible are not inhabited nor do they house any type of infrastructure, except for installations belonging to a private firm in the cattle business located along the banks of the river and outside the buffer zone.



- Sheet 29: State of conservation and control points, Component 01, Faldeo Norte del Morro de Arica with potential flood zone due to tidal waves in the city of Arica.

Seaquakes

The city of Arica has historic records of several seaquakes occurring throughout its history, examples of which are the seaquakes of 1604, 1868, 1877 and 2014.

Judging by the map of floods due to seaquakes in the city of Arica prepared by the Hydrographic and Oceanographic Service of the Navy (SHOA, 2012), the area of the Property would not be directly affected by a seaquake; however, the neighboring area located toward the north and outside the buffer zone in the urban center of the city is highly susceptible.

In the case of Desembocadura de Camarones, there are no specific records of historic seaquakes; however, the geological and geomorphological characteristics of the component imply that the lower part of the valley and the area where it flows into the ocean and the beach (which are a part of the Property) are highly susceptible to these types of phenomena.

Volcanic phenomena

Outside the area of the territory of the Property which includes the whole of its sphere of influence, in the high ranges of the Cordillera in the Region of Arica and Parinacota, there is an ongoing record of volcanic activity, dating back to the Miocene and up to the present.

Both components of the Property are located at more than 100 Kms from the present volcanic arc (located in the Western Cordillera), so the danger that it could be directly affected by volcanic activity is remote.

Notwithstanding the foregoing, there do exist indirect consequences associated with a large volcanic eruption. For example, after an eruption, the large volumes of volcanic materials are carried by the rivers and they could fill up the present bed quite quickly, producing drastic changes in the hydrological system. Events of such a magnitude of recurrence and so slight as to be considered unlikely in the short term, they cannot be ruled out entirely.

The effects of natural threats

Component 01 Faldeo Norte del Morro de Arica

The Morro de Arica is a generalizing landmark that clearly stands out on the coastal landscape of the city of Arica, so it could have been considered as a geographic symbol of the relevance of the cosmovision of these former settlers, creating strong links of identity which would explain the persistence of their occupation as a place where to lay their loved ones to rest. It is precisely this aspect which possibly provides a uniqueness to the place.

Within this context then, the relationship between the geomorphological characteristics identified within this context and the natural threats identified in the component become relevant.

In accordance with what has been hitherto stated, mass movements are the only hazard that could directly affect this component.

- **Mass movements**

The geomorphological, stratigraphic and soil characteristics in this component, together with the regional seismic activity are determining factors for the development of soil slides and rock falls. In addition to this, we must consider other factors that could trigger them, such as the gradient of the land, the expansion of the urban settlements over the slopes and the interventions carried out by the inhabitants themselves on those slopes. This situation means that soil slides and rock falls would not only affect the Property, but they would also constitute a source of disaster for any population living there.

Within the area of the component, the place where there is a greater recurrence of mass movements is along the external border of the Property; along the north-west face of the Morro. This sector is mostly affected possibly because of a generalized fissuring the hill sustained when – between 1960 and 1965 – it was used as a quarry for when the breakwater in the port was being built, as well as the connection to the former Alacrán Island (Figure 85). Nonetheless, to the north of the archeological settlement where there is rocky soil, there is also evidence of the risks of soil slides and rock falls. The steepness of the slopes is the main determining factor for these phenomena, whilst earthquakes and human pressures act as relevant triggering factors. The seriousness of the effects associated with the recurring seismic activity in the region is directly related to the nearness of the epicenter and the magnitude of the event causing it. On the other hand, the outward expansion of the urban settlements is also capable of triggering soil slides along the steepest areas of the rock.

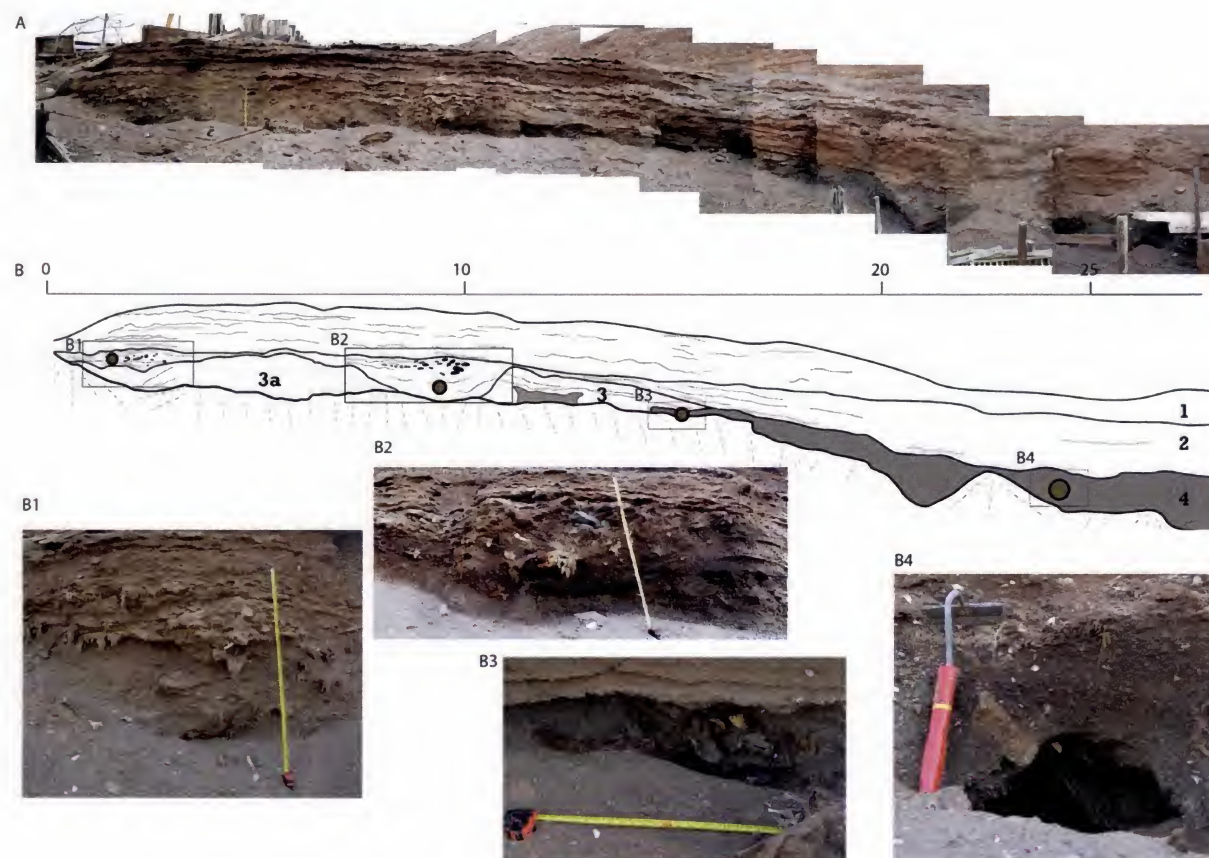


- *Figure 85: The north face of the Morro de Arica. In 1964, Alacrán Island was joined to the city of Arica and rock was removed from the Morro when going about the works of joining the island to the continent.*
SOURCE: CRESPO, M. 2017. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA

Over the years, mass movements have had a direct influence on the conservation of the deposits and human remains which has been proved by stratigraphic studies of the sections exposed in the north-west of the component, Archeological Reserva N° 2 (Figures 86 and 87). This section is 30 mts. long by 2 mts. high, aligned in a NW-SE direction; i.e. it is approximately perpendicular to the line of the slope's maximum gradient. Horizontally, four units are worthy of analysis. It should be mentioned that four human burial sites were found that are possibly in a secondary position.



• Figure 86: North-east sector of Archeological Reserva N° 2, the Faldeo Norte del Morro de Arica.
SOURCE: CRESPO, M. 2017. MANAGEMENT AND PROTECTION PLAN OF CHINCHORRO SITES. UTA.



• Figure 87: Figure of an assembly of the section exposed (A) and the units identified from studies (B). B1, B2, B3, B4: possible burial sites in a secondary position (sensitive to disturbances due to sedimentary processes).
SOURCE: SITZIA, L. 2017

- **Seismic threats**

Because of the stratigraphic analyses carried out on the four main units exposed in the sector, some alterations were identified caused by induced seismic phenomena (Table 32). In addition to that were the human factors that heightened the intensity of these effects. The analyses revealed the complexity of the deposits present and whose origin is, without a doubt, colluvial. Although the disturbance phenomena suggest that the bodies visible are the result of transport on the slope from another location higher up, it cannot be ruled out that, in some cases, they are burials of mummified bodies in a primary position (Figure 88).

In relation to the gravity of the effects associated the damages are slightly reversible. Moreover, in the event of induced seismic events, it must be considered that there is a population exposed to the consequences of alteration.



- *Figure 88: Human remains inside the strata present (regarding disturbances due to sedimentary processes). Unit 4 the north-west profile of the Faldeo Norte del Morro de Arica.*
SOURCE: SITZIA, L. 2017

EFFECTS OF MASS MOVEMENTS ON THE STRATIGRAPHY OF THE FALDEO NORTE DEL MORRO DE ARICA.	
UNIT	DESCRIPTION
1	Colluvial deposits The archeological remains stem from soil displacement and erosion caused by one or more human occupations located over the section exposed (in the direction of the foot of the cliff). This means that their location in the stratigraphy probably does not reflect their initial position.
2	Colluvial deposits. Unlike unit 1, this one appears to have a greater abundance of archeological remains (fragments of shells, sea snails, carbon, micro carbons and fish bones) as well as human remains inside the strata present. The architectonic structures in the channel that have been observed contain possible remains of burials and they are interpreted as dynamic figures of sedimentary origin. Possibly the bodies or "burials" visible in these channels are most likely in a secondary position.
3	Colluvial deposits. Human remains affected by processes of a sedimentary origin.
4	Unit 4 is of human origin due to the abundance of archeological remains (fragments of shells, sea snails, carbon and micro carbons and fish bones). Two possible mummies, one shrouded in cameloid skin or woolen material and the other in matting have been observed in this unit. Of what has been seen in the section exposed, there is no geometry of stratification in this unit typical of the other units. Nevertheless, bearing in mind the scant exposure of this unit, the possibility cannot be excluded of lateral transport by granular flows.

- *Table 32: Effects of mass movements on the stratigraphy of the Faldeo Norte del Morro de Arica.*

- **Seismic threats**

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- *Table 32: Effects of mass movements on the stratigraphy of the Faldeo Norte del Morro de Arica.*

Component 02, Desembocadura de Camarones

- Mass movements

THE EFFECTS OF MASS MOVEMENTS ON THE COMPONENT IN DESEMBOCADURA DE CAMARONES.	
SOUTH TERRACE SECTOR NOT AFFECTED DIRECTLY BY MASS MOVEMENT PROCESSES	
Archeological Site/ Sector	Effects
CAM 14 CA/17	These sites are not exposed to the effects of mass movements, but they are restricted toward the south with an area susceptible that is associated with the slopes of the hill and small gullies running down their sides.
CA/8	This site is not exposed to the effects of mass movements, but it is restricted toward the south with an area susceptible that is associated with the slopes of the hills and small gullies running down their sides.
CAM -1	Site located in an area of high susceptibility of mass movements.
CAM-2	Site located outside the areas susceptible to mass movements.
South Cliff Sector Sector with geomorphological differences marked by a steep slope with colluvial deposits and profiles exposed of up to 4 meters and a terrace sector that ends in the cliff. The natural instability of the steep gradient is heightened by a cut in the hillside where a road to the dock was built. The archeological sites located on the steep slopes have been partially altered by the displacement of soil and rock falls, which benefits the exposure of bodies, archeological materials and collapsed structures. All the archeological sites located in this sector are found within an area susceptible to being reached by mass movements. Although not in all cases is there evidence so clear as to affect movements, all these sites in the South Cliff could be potentially affected.	
Archeological Site/ Sector	Effects
CAM-SUR	A part of the profiles were found collapsed, possibly as a result of interaction between seismic movements and human activity. The exposure of the profiles facilitates the erosive action of the wind. With regard to the archeological materials on the surface, the majority are lithic Artifacts, so they are not sensitive to atmospheric alteration factors
CAM15-A CAM 15-D CAM 15-E	An area of active colluvial deposits which are characterized as unstable and, therefore, vulnerable in the event of an earthquake, especially if the reoccurrence is considered of such phenomena in the Region (historic background information). Archeological sites more problematic in terms of conservation because of their vulnerability in the event of natural and human factors. It is a multi-component funeral sector that is located on steep slopes where soil slides and rock falls are very common. Part of the site was altered by a cut in the slope as a result of road works. It appears that the materials pile up at the feet of the slope (along the road), something that led to the construction of gabions as a way in which to protect against landslides and in order to come to the aid of possible accidents as a result of rock falls, bearing in mind possible earthquakes that could occur. The permanent sliding of the soil caused the exposure of the bio-anthropological remains, their disarticulation, transport and redeposition.
CAM 15-B CAM 15-C	This sector consists of littoral and anthropic deposits located between the road and the coastal cliff affected mainly by the effects of wind and human erosion.

• Table 33: The effects of mass movements on the component in Desembocadura de Camarones.

Summary of the Natural Hazards and their consideration within the Program of Conservation and Risks of the Chinchorro Culture Settlement

Tables 34 and 35 show a summary of the natural hazards identified in the components of the Faldeo Norte del Morro de Arica and Desembocadura de Camarones. They were analyzed according to the incidence criteria concerning the conservation of the Property (directly or indirectly over the spatial extension of possible damages). Both parameters are relevant because they enable us to categorize the actions and measures proposed in the *Conservation and Risk Program of the Archeological Settlement of the Chinchorro Culture*.

SUMMARY OF THE NATURAL HAZARDS AND THEIR EFFECTS ON THE COMPONENT OF THE FALDEO NORTE DEL MORRO DE ARICA				
TYPE OF HAZARD	EFFECT ON THE COMPONENT (DIRECT OR INDIRECT)	AREA POTENTIALLY AFFECTED	DAMAGES RECORDED OR EXPECTED	REMARKS
Seismicity	Direct. Because earthquakes cause earth movements and act as triggering factors for mass movements	The whole of the area affected by seismic movements. Slopes where mass movements are generated	Earth movements as such have not caused any significant damage to the Property. The major damage is associated with mass movements triggered by large earthquakes	The main problem associated with this hazard is that it acts as a trigger for mass movements
Volcanic activity	Indirect. The volcanoes active in the region are located more than 100 Kms. away	Does not affect the area of the Property nor its buffer zone	Changes in the hydrology of the rivers and contamination of waters	-----
Mass movements	Direct. Hazard declared and potential of mass movements on slopes containing archeological sites	Archeological Site Reservas N° 1 and N°2.	Removal of bodies, exposure of archeological materials, destruction of archeological sites, infrastructure in the surroundings	The danger of mass movements is of a natural origin; however, human interventions worsen the situation of these processes; in some cases triggering new mass movements
Flooding	This is not a hazard inside the area of the Property nor in its buffer zone	-----	-----	-----
Floods as a result of Seaquakes	Indirect. It is not a danger within the area of the Property nor inside its buffer zone. In the event of a seaquake, only its closest environment might be affected	Sectors of the environment near the buffer zone located below the 20 m. level	-----	-----

• Table 34: Summary of the natural hazards and their effects on the component of the Faldeo Norte del Morro de Arica.

A SUMMARY OF THE NATURAL HAZARDS AND THEIR EFFECTS ON DESEMBOCADURA DE CAMARONES				
TYPE OF HAZARD	EFFECT ON THE COMPONENT (DIRECT OR INDIRECT)	AREA POTENTIALLY AFFECTED	DAMAGES RECORDED OR EXPECTED	REMARKS
Seismicity	Direct. Because earthquakes cause earth movements and act as a trigger for mass movements	All of the area affected by seismic movements. Areas where mass movements are generated	Earth movements as such have not caused any significant damage to the Property. Major damages are associated with mass movements triggered by large earthquakes	The main problem associated with this hazard is that it acts as a trigger for mass movements
Volcanic activity	Indirect. Any volcanoes active in the region are located more than 100 Kms. away	Does not affect the area of the Property. It might only affect the Camarones River, but given the distance from any active volcanoes, this type of phenomena is one of a very low occurrence considered	Changes in the hydrological system of the rivers, contaminated waters	Refers to an indirect hazard and one that is very unlikely, so not affecting the Property

Mass movement	Direct. A declared and potential hazard of mass movement on slopes containing archeological sites	South Cliff Sector where sites CAM-SUR and Camarones 15 are located	Removal of bodies, exposure of archeological materials and the destruction of archeological sites & road infrastructure	The danger of mass movements of a natural nature; however, human interventions act to worsen these processes, in some cases triggering new mass movements
Flooding	Indirect. The bed of the Camarones River lies in a part of the buffer area	Low areas around the active river course (floodplain and low terraces). These do not correspond to inhabited areas or contain infrastructure. There are only installations belonging to private companies in the surrounding, outside the buffer zone.	No damage is expected that could affect the Property	-----
Floods as a result of Seauakes	Indirect. Inside the buffer zone there are areas that are susceptible	Sectors close to sea level, such as the fishermen's cove, beach, meadows and river bed	No damages are expected that could affect the Property. Damages could occur in the sector of the fishermen's cove	It is considered as an indirect hazard because it does not affect the area of the Property. However, the population living inside the buffer zone could find themselves affected by damages to infrastructure (the fishermen's cove) or because they are outside the safe zones when a seauake occurs

Table 35: A summary of the natural hazards and their effects on Desembocadura de Camarones.

Preparing for risks

Threatened by earthquake and tsunamis, the State of Chile, through the National Emergency Office of the Ministry of the Interior has developed plans regarding flooding and evacuation strategies. These maps have been designed to inform the community of the areas at risk in the event of a tsunami, whilst containing safety guidelines, meeting points, roads, paths and mentioning flood areas. In addition to this, drills are regularly held in the Region aimed at fostering a preventive culture and self-help as a society, as well as putting into practice evacuation plans in the event of a tsunami.

From a human point of view, the location of populated areas under a scant or zero strategic territorial planning that considers natural risks is an ongoing problem. From a point of view of the potential for organization to confront natural risks, there are few opportunities in which, because of self-initiative, Emergency Committees have been formed by the population; rather it has been up to the local government to do anything in this respect.

In Chile, year after year, natural disasters occur all over the country. This history, marked by successive catastrophes, led to the creation in March 1974 of the National Emergency Office of the Ministry of the Interior (ONEMI) which is a State-sponsored technical body in charge of civil protection. From its very beginnings, the ONEMI did more of a reactive job, acting and coordinating emergency aid mechanisms in the wake of the occurrence of some or other disaster. However, due to a lack of guidelines in view of present needs, in March 2002 the new National Emergency Plan was approved which has moved forward on matters concerning methodology, conceptualization and the handling of situations before, during and after an event, it continues delegating the preparation of risk studies to the Regional Governments, Provincial Governments and Municipalities (through its emergency committees).

4.b.iv. Responsible visitation at World Heritage sites

The party responsible at a World Heritage Site will be the Management Unit of the Municipality of Camarones in the case of Component 02, the Desembocadura de Camarones and, in the case of Component 01, the Faldeo Norte del Morro will be under the joint guardianship of the Management Unit of the Municipality of Arica and the University of Tarapacá. Regarding the Site Museum of Colón 10, it will continue to remain under the direct administration of the University of Tarapacá.

Having said that, these technical units will be coordinated through the Department for the Management of Projects and Sustainability of the Corporation and under the direct supervision of Director of that unit. (see item 5.e).

4.b.v. Number of inhabitants within the property and the buffer zone

- **Component 01, Faldeo Norte del Morro de Arica**

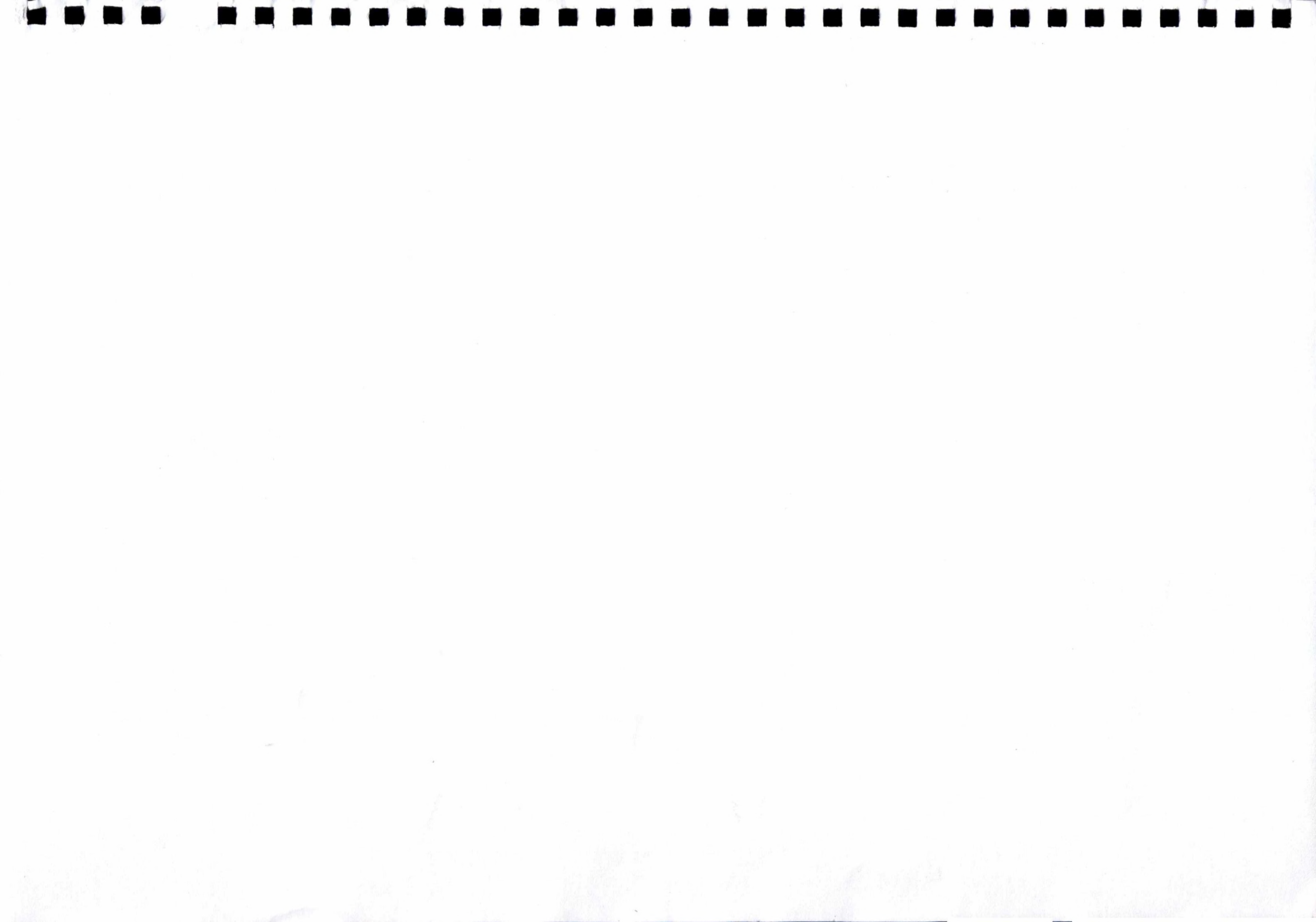
Population estimated on the inside of:

The area of the Property proposed	0 inhabitants
The Buffer Zone	285 inhabitants
Total	285 inhabitants
In 2017	

- **Component 02, Desembocadura de Camarones**

Population estimated on the inside of:

The area of the Property proposed	86 inhabitants
The Buffer Zone	0 inhabitants
Total	86 inhabitants
In 2017	



NOMINATION OF THE SETTLEMENT AND ARTIFICIAL MUMMIFICATION

OF THE CHINCHORRO CULTURE IN
THE ARICA AND PARINACOTA REGION



GOBIERNO REGIONAL PUNO